The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXXV. August 15, 1936 No. 894

The Problem of Employee Selection—II

IN discussing the problem of the selection of works and office staff last week, attention was drawn to the unreliability of the present form of examination as a method of assessing the personal value of the mental characteristics of any individual, and the work of a strong official body upon the subject was quoted in evidence of this conclusion. The question was asked what is to be put in place of the examination if it it not reliable and if no means can be found for making it so. In the report presented to this body by Sir Philip Hartog and Dr. E. C. Rhodes it is not recommended that examinations should be discarded since "examinations as a test of efficiency are necessary . . . but it is as impracticable to recommend an *a priori* cure for the defects of the present examination system as it would be to recommend an *a priori* cure for a disease. It is only by careful and systematic experiment that methods of examination can be devised not liable to the distressing uncertainties of the present system."

The results of the inquiry, in short, are such as should cause educationists the world over to set to work by experiment to recast their methods of assessing the effects upon the individual of the system of training they have given him. Meanwhile it may well be asked whether any method devised by educationists for this purpose is likely to be wholly satisfactory for assessing the value of the examinee to an industry where something more than book learning is needed.

The attention of those seeking an answer may be directed to the annual report of the National Institute of Industrial Psychology. The Institute contains many names known to chemists and to industry in general. Among the many industrial activities of this body that of vocational guidance plays a prominent part. The Institute has by painstaking experimental methods devised vocational tests for guiding the young into the paths best suited for them, and alternatively of selecting those who are best suited to a given type of work. The methods of educationists are based on tradition, a tradition that has grown up within the more cloistered establishments, and that is apparently not suitable even for the purpose for which it was devised, far less for the selection or grading of the human raw material for modern industry.

There is this to be said for psychological selection, that it is based upon a modern development of scientific deduction by experiment and that it has an *a priori* chance of being suitable for modern scientific industry. It is stated in the report, for example, that "in giving vocational guidance, the reliability of the advice depends both on the accuracy with which the applicant's abilities and temperament are assessed, and on the examiner's knowledge of what abilities and what temperamental qualities are demanded by the various occupations which he must consider for the applicant. The technique of vocational guidance can therefore be advanced not only by a refinement in the methods used to assess the psychological characteristics of an individual, but also by the preparation of more exact analyses of the demands of careers."

This seems to be along sound scientific lines, and for that reason we are disposed to suggest that it may well be through the work of this Institute that the problem of selection is most likely to be solved. The movement is undoubtedly growing. A scheme inaugurated some years ago by the Institute for the City of Birmingham has been successful and is still in operation. Many local education authorities have approached the Institute concerning the training of teachers and junior employment officers in psychological methods. The City of Hull arranged for the Institute to give an extended course of instruction to its teachers and employment officers. It must not be considered that the application of psychological methods has yet attained to the status of a clearly defined scientific process. The quotation just given shows that much has yet to be done before finality is attained.

The science is still in the experimental stage, but at least the Ministry of Labour's advisory councils in their joint report on "The organisation and development of vocational guidance service in Great Britain" suggest that trained psychologists should examine children in the schools in co-operation with the school authorities. Vocational advice would then be given by employment officers using the data thus devised "preferably after personal consultation with the psychologist." The Institute's report shows that industrialists, including chemical factories, are availing themselves of the facilities afforded by the Institute's staff, not only for general factory organisation and "smoothing the wheels," but also for vocational selection.

As an example, in one factory the Institute was "faced with an array of over 100 different jobs. Fortunately examination showed that from the psychological standpoint they could be arranged in eight groups, so that the problem was reduced to finding tests for eight instead of 100 different types of work." Those industrialists who are facing problems of selection and of too rapid labour turnover might do worse than try the method of psychological selection instead of that of examination by traditional educational methods.

Notes and Comments

Widnes as Defence Work Centre

A MOVEMENT is afoot to place Widnes—already one of the most important centres of the chemical industry—"on the map" in connection with the national defence scheme. When Dr. Leslie Burgin, Parliamentary Secretary of the Board of Trade, visited the town last year he promised to make a special point of putting forward to the Government authorities the desirability of getting the Gossage works re-started, and now Mr. Richard Pilkington, the Member of Parliament for the Division, has brought the claims of the area to the notice of Sir Thomas Inskip, the recently appointed Defence Minister. The Gossage works, which five years ago were employing 2,000 workers, represent in Mr. Pilkington's view, a very strategic point in regard to communication by rail, water and road. It is a colossal place from the space point of view and an admirable place for the Government to consider. To-day there are some 1,600 unemployed at Widnes, and the re-opening of the works would practically solve the unemployment problem there. It was said at a recent meeting of the Lancashire Industrial Council that Lancashire had now got its feet within the door. If Widnes succeeds in getting this new movement towards recognition as a defence works centre going it will have got its shoulders in the door as well. The co-operation of all the parties interested is being sought with that end in view.

Trade Opportunity in Portugal

PORTUGAL has embarked upon a Fifteen Year Plan which offers an exceptional opportunity to British exporters of chemical plant, heavy machinery, scientific instruments and all the various chemical products which are required in the modernisation of a nation's industrial activities. Portugal is adhering to the sterling standard, which she regards as preferable to the gold standard, and the cumulative effects of the efforts that are being made to ensure prosperity should have a desirable sequel to assisting Portuguese traders to buy in foreign markets. Some first-hand impressions of the present opportunity were given by Mr. Luiz Marques, Portuguese representative of our sister journal, "Industria Britanica," in a recent address at Bouverie House, in the course of which he urged a concerted British trading campaign on the lines of collective action through British representative bodies in Portugal. British exporters to Portugal must be prepared for more State intervention than is the case in the United Kingdom. Another point is that Portuguese people do not pursue business with the same avidity as some other peoples. At first sight they appear over-casual and neglectful of business opportunities. This should not disturb the exporter. It is a matter which involves knowing the Portuguese philosophy of life and temperament, and reflects the fact that they have not yet disciplined their commercial relations. Mr. Marques dispelled any idea that his countrymen do not wish to do business or are not straightforward in their methods. After the first surprise on introduction to business conditions and after a certain adaptation to those same conditions, the British exporter will find it perfectly easy and profitable to trade with Portugal. The real future for British exporters to Portugal lies not so much in the direction of ready-made articles as in machinery and other equipment for production.

Wealth in Sea Water

DURING the two and a half years in which the bromine plant of the Ethyl-Dow Chemical Co. at Kure Beach, near Wilmington, North Carolina, has been in operation, one square mile of sea water, 172 feet deep, equivalent to 308,586,000,000 lb., has been pumped in the process of producing bromine. Present in this quantity of sea water were materials weighing a total of 5,669,335 tons, which, if converted into cash at current quotations, would bring in a revenue of £33,212,000. Bromine recovered commercially totalled over 10,000 tons. Potential by-products, not actually recovered from the sea water, and their values included:—Sodium chloride (common salt), 4,160,000 tons, £11,140,000; magnesium sulphate (Epsom salts), 1,055,000 tons, £8,050,000; calcium chloride, 229,000 tons, £1,008,000; potassium chloride, 118,600 tons, £1,838,000; magnesium, 95,000 tons, £9,520,000; aluminium, 270 tons, £20,520; strontium carbonate, 314 tons, £37,700; iron, 284 tons, £3,410; copper, 18 tons, £684; iodine, 6.28 tons, £3,764; silver, 3.07 tons, £11,440; gold, 0.089 tons, £16,480. Besides these main constituents, practically every element and compound is dissolved in the ocean water to a greater or lesser extent. In extracting bromine from sea water, now an established industrial operation, chemical science has accomplished the initial conquest of nature's greatest reservoir of minerals, though economic recovery of by-products is still a problem.

Utilising Government Facilities

RELATIVELY few business men know that they have in the Department of Overseas Trade in London and the United States Department of Commerce at Washington, a service agency of tremendous practical importance to them. Those chemical manufacturers and merchants who engage in foreign trade may find that both of these sources make available the latest market information, and indeed actual trade opportunities, which are of great value in expanding foreign business, whether exporting or importing. In the field of domestic commerce there are also specialised services which the Bureau is able to provide, such as current data on retail sales, credit and collection information, and special industrial and economic studies ranging from consumer information to estimates of the national income. There is no business which is not confronted with a great variety of problems. To solve these problems frequently requires a broader contact with business than it is possible for the individual business man to have. The service divisions of the United States Department of Commerce, for instance, make it their business to develop these wide contacts; in fact, the great variety of problems which are continually brought to them for solution has developed a resourcefulness as well as a store of factual information which is proving very useful to the many business men who are taking advantage of it.

Enamel Mill Room Practice

With Special Reference to Grinding Mills*

By G. STEELE and W. MARSHALL

AMONG the various sections of a vitreous enamelling plant, none needs more careful control than the milling operation. The ease with which the enamel may be applied and handled, and the quality of the finished enamel product is, to a large extent, dependent on the development and maintenance of a satisfactory mill room technique. It will be apparent from the different topics here discussed that this requires very close control. Indeed, the subject matter of this paper is concerned more particularly with the conditions of charging and running of ball mills which give the most satisfactory grinding.

It is not intended to say more under this heading than to mention that the mill room should be conveniently located in the works for the receipt of raw materials and for the distribution of the milled enamel. The room should have good lighting, adequate heating and ventilation, a fair proportion of unoccupied floor space, and ample drainage for wash water. Concrete foundations for the mills are generally recommended. Under these conditions cleanliness is readily maintained, and accurate adherence to a specified routine easily carried out, with the production of enamel of uniform quality.

There should be a sufficiency of mills to suit the range of enamels manufactured. It is false economy to operate with too few mills. The cost of additional equipment may soon be recovered in the saving in time, labour, and material resulting from less washing and cleaning of the mills. The danger of contaminating one enamel with another is also minimised.

Mill Linings

The materials used for lining ball mills are (a) porcelain; (b) silex silica rock; and (c) rubber.

Porcelain brick linings are in general use for grinding white enamels. They may be made either by the dust-pressed or by the plastic process. Those made by the former process are very regular in shape, and therefore allow close joints to be made with them. They are somewhat more friable than those made by the plastic process, but these latter are not so true to shape, since they tend to warp during drying. The joints obtained with the plastic process bricks are thus somewhat wider. Porcelain bricks, if under-fired, not only wear down faster and contaminate the enamel, but wear down unevenly. The lining may even be worn through to the steel in certain spots, while the adjoining brick may still be in fair condition. The penetrability of the porcelain to liquids must also be extremely low, otherwise it would not be possible to mill successive mixes of different colours satisfactorily.

Silex blocks of the ordinary type give linings which are sutable only for under coatings or second quality enamels. Their shape is so irregular that wide joints occur which require filling with cement. Contamination of the enamel with jointing cement thus occurs. Silex blocks can be obtained with the faces ground true to shape. These are very expensive, but last about four times as long as porcelain blocks. They provide a lining quite suitable for the highest quality enamels.

Rubber lined mills are in the experimental and development stage, but their application appears to be limited to wet grinding. The lining may be as little as ¼ in. in thickness. It must be vulcanised to the metal by a special process and this requires the transport of the cylinder to the rubber manufacturers' plant.

In fixing the lining, whether of porcelian or silex, the design of the mill should be such that there are no continuous circumferential joints between the blocks in the centre of the mill. Wear usually commences at this point, and a continuous ring of joints would be a source of weakness. To obviate this, lining is generally carried out through openings in the ends of the barrel. It is also recommended not to complete the lining of a mill in one operation, but to pause when a segment of the cylinder walls and a part of the end walls have been installed, so that the joints may dry and set, and any natural shrinkage in the cement take place before continuing. Joints should not exceed 1/32 in. in thickness.

The lining requires special reinforcement in the region of the manhole and discharge openings. For this reason metal shrouds are fitted which project inwards to about half the depth of the lining blocks, which should fit accurately to the surface of the shrouds. Well fitting manhole and discharge covers are obviously an essential (Fig. 1).

Grinding Media

In the vitreous enamelling industry the grinding media are usually (a) flint pebbles, or (b) porcelain balls. The flint pebbles are usually obtained either from Denmark or France.

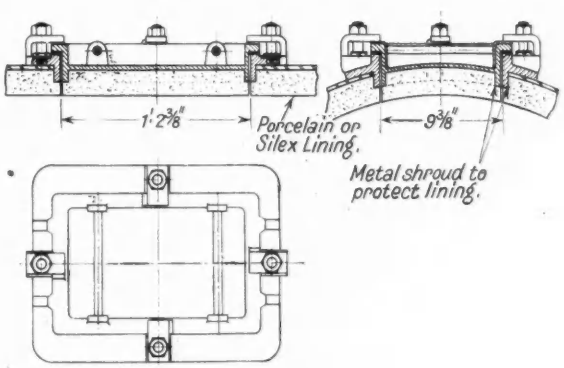

Fig. 1.

Those from Denmark are generally favoured on account of their more regular shape and freedom from cavities. In such cavities unground material tends to accumulate. On the other hand experience in some enamel plants has shown that the Danish flints have a greater tendency to chip on the surface In some circumstances, therefore, selected French flints free from cavities are preferred.

Porcelain balls, like porcelain linings, should possess negligible penetrability to liquids and considerable toughness and hardness. High-class products are available which show no absorption of fuchsin dye even under exceptionally high pressures. Such products can be used for grinding high-quality enamel. Of course, they should be of assorted sizes to prevent grooving of the lining due to the balls of one size always travelling in the same path.

Efficiency of Grinding by Wet Process

The efficiency of the grinding process depends on a number of factors, among which may be included: (1) the size of balls or pebbles; (2) the speed of rotation of the mill; (3) relative volume of mill, grinding media, and mill charge.

The grinding action in the ball mill is a combination of percussive and rubbing actions, though in wet grinding rubbing largely exceeds impact. In either case the extent of grinding is dependent on the number of contacts taking place

* A paper read before the Northern Section of the Institute of Vitreous Enamellers, at Manchester.

between the pebbles or balls themselves and between them and the lining of the mill. From this point of view the smaller the size of the grinding media the more grinding will be accomplished. The limiting effective size of pebbles or balls will thus depend on the size of the grains of frit and also on the consistency of the enamel being ground. Stiffer and heavier enamels will thus require the smallest size balls in the batch to be heavier or larger than will the thinner and more fluid preparations. It is also apparent why excessive wear would occur if mills were run for any length of time with pebbles and water only.

In practice these principles may be adapted by charging the mill with 75 to 90 per cent. of the normal volume of balls of the smallest effective size, using much larger ones for the remaining 10 to 25 per cent. These larger units act as agitators. S. W. Kendall has recommended the sizes quoted in Table I for grinding average types of paint, and they are suitable also for vitreous enamels.

TABLE I.

Diam. of mill. Ft.	Grinding media	Per cent. and size of Small balls	Large balls
1 to 2	Porcelain	90%—¾ in	10%—2 in
	Pebbles	85%—1 to 1½ in	15%—2½ in
2 to 3½	Porcelain	85%—¾ in	15%—2 in
	Pebbles	80%—1 to 1½ in	20%—2½-3 in
3½ to 5½	Porcelain	80%—¾ in	20%—2½ in
	Pebbles	75%—1 to 1½ in	25%—3½-4 in

Speed and Efficiency

The speed of rotation of ball mills has an appreciable effect on the efficiency of the grinding process, and the time required to mill a batch of enamel. When a mill is directly coupled to an electric motor with a variable speed adjustment, it is possible to test, by including an ammeter in the circuit, at what speed the maximum amperage is recorded. This is the speed at which the motor is performing the greatest amount of work on the mill. At greater speeds the balls tend to rotate with the mill, being held by centrifugal force, and perform less useful work on the material to be ground (Fig. 2).

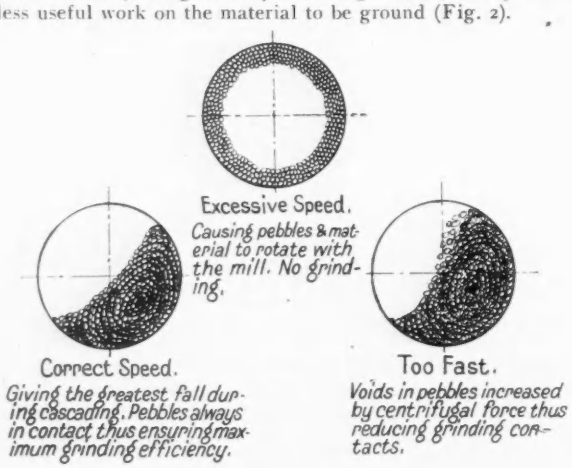
Excessive Speed.
Causing pebbles & material to rotate with the mill. No grinding.
Correct Speed.
Giving the greatest fall during cascading. Pebbles always in contact thus ensuring maximum grinding efficiency.
Too Fast.
Voids in pebbles increased by centrifugal force thus reducing grinding contacts.

Fig. 2.

Several rules have been proposed. For wet grinding specifically, we have J. W. Mellor's expression

$$\text{R.P.M.} = 43{\cdot}3\sqrt{\frac{1}{D-d}}$$

where D is the internal diameter of the mill and d the average diameter of pebbles in feet. S. W. Kendall has evolved the expression

$$\text{R.P.M.} = \frac{140 \times M \times A \times C \times F}{\sqrt{D}}$$

from experiments on grinding paints and lacquers. Factor M depends on the lining and grinding media. For porcelain balls and lining its value is 1. For flint pebbles and silex lining it is 1.04. For the smooth linings used in enamel work, factor A is also equal to 1. C is a consistency factor which is 1 for normal consistency, and may reach 1.5 for thin-bodied products and 0.6 for highly viscous mixes. F is a factor depending on the inside diameter of the mill. For mills of inside diameter 24-48 in., F is given the value of 1.07; for under 24 in. F is given the value 1.21. D is the inside diameter in inches.

Table II gives the results of evaluating these expressions various size mills.

TABLE II.

Diam. of mill. Ft.	in.	Inside Diam. of mill Ft.	Speed of mill in revs /min Kendall's formula High viscous	Normal	Mellor's formula. Thin	
7	0	6.52	10.2	17.0	25.4	17.3
6	0	5.55	11.0	18.5	27.7	18.6
5	6	5.05	11.6	19.3	28.9	19.5
5	0	4.55	12.2	20.3	30.4	20.7
4	6	4.06	12.9	21.6	32.3	22.4
4	0	3.54	13.8	23.0	34.5	23.6
3	6	3.06	14.9	24.8	37.2	25.4
3	0	2.67	15.9	26.6	39.8	27.4
2	9	2.38	16.9	28.3	42.2	29.1
2	6	2.13	17.9	29.8	44.6	30.6
2	0	1.64	23.0	38.0	57.2	35.4
1	9	1.40	24.9	41.0	62.0	38.0
1	3	1.00	29.5	49.2	74.0	45.2
1	0	0.75	34.0	55.5	85.0	53.0

It will be seen that both Mellor's and Kendall's formulæ agree for normal consistencies and they are also substantiated by practical experience to a considerable degree.

Cascading Surface

When a mill is rotated at the appropriate speed there occurs cascading of those balls which have been raised to the maximum height, over the surface of the other balls, to the lowest position. Maximum grinding occurs when this cascading surface is also a maximum. This is attained with an apparent volume of grinding media of 45 per cent. of the volume of the mill. The voids in this apparent volume will not be far from 40 per cent. Indeed, a number of tests on porcelain balls and on pebbles of sizes and proportions suitable for grinding media failed to reveal more than slight variations from this value of 40 per cent. For the most efficient grinding, therefore, there should be enough material to fill this void space. Less than this amount means that the full grinding surface of the pebbles is not being utilised continuously, whilst an amount in excess of this entails a proportion of frit not in contact with a grinding surface. On this basis the correct volume of dry frit to be added should be 40 per cent. of 45 per cent. of the volume of the mill, *i.e.*, 18 per cent.

On theoretical grounds there may be some justification for

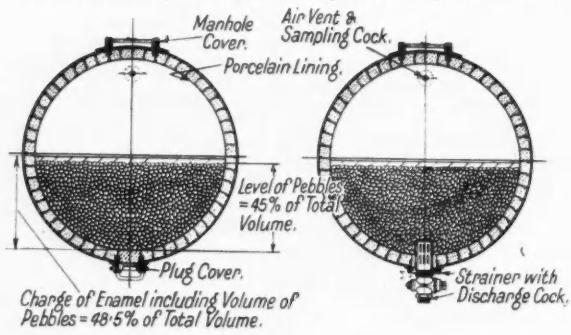
Manhole Cover.
Air Vent & Sampling Cock.
Porcelain Lining.
Level of Pebbles = 45% of Total Volume.
Plug Cover.
Strainer with Discharge Cock.
Charge of Enamel including Volume of Pebbles = 48·5% of Total Volume.

Fig. 3.—Section of Pebble Mill for Wet Grinding.

adding rather more than the 18 per cent. (1) The charge is required just to cover the pebbles and not merely to come up to the average level of the surface of pebbles. (2) A proportion of frit will be trapped between the pebbles, thus they will be spaced slightly further apart than when unmixed with other materials. Slightly more frit will, therefore, be needed to occupy the interstices between the pebbles. For these

reasons it is suggested that the volume of frit to be charged should be raised to 21.5 per cent. of the volume of the mill. The result of a number of tests have also confirmed that the most efficacious volume of charge is quite close to this value.

As regards the quantity of water to be added in the charge, the ideal, from the point of view of the extent of grinding surface, would be that the water should merely occupy the voids in the frit. Measurements of the voids in different samples of commercial frits have shown that these also are in the vicinity of 40 per cent. Thus the water to be added should be 40 per cent. of the apparent volume of frit, or 8.5 per cent. of the volume of the mill—an amount which again agrees well with practice.

Best Conditions for Wet Grinding

To summarise, therefore, the best conditions for wet grinding efficiency would appear to be (1) a charge of grinding media of as small a size as practicable, with a few larger ones to act as agitators and crushers of the larger pieces of frit; (2) the charge to be 45 per cent. of the volume of the mill; (3) the speed of rotation to be such that the charge remains compact but rises to the maximum height on rotation, maintaining the pebbles in this compact form; (4) the frit to constitute 21.5 per cent. of the volume of the mill; and (5) the water to constitute 8.5 per cent. of the volume of the mill. These points are represented pictorially in Figs. 2 and 3. Suggested weights of frit and water for different sized mills are given in Table III and converted to weight measurements.

TABLE III.
Charges for various sizes of mills—porcelain lined

Size of mill Outside dimensions, diam., length	Total capacity cubic ft.	Charges (lbs.) Pebbles. lb.	80 lb. per cubic ft.	85 lb. per cubic ft.	90 lb. per cubic ft.	Frit. 95 lb. per cubic ft.	100 lb. per cubic ft.	Water lbs.
2′ 0″ × 2′ 0″	3.44	155	59	63	66	70	74	18½
2′ 6″ × 2′ 6″	7.55	340	130	138	146	154	162	41
2′ 9″ × 2′ 9″	10.50	472	181	192	203	214	226	57
3′ 0″ × 3′ 0″	14.10	635	243	258	274	288	304	76
3′ 6″ × 3 6″	20.00	900	344	366	387	408	430	108
4′ 0″ × 4′ 0″	31.8	1,430	547	582	616	650	685	171

While the above conditions are put forward as likely to yield enamel slip most efficiently, regard must be paid to the *convenience* of working. It may be more economical to grind larger charges than those recommended, despite the fact that more than a proportionate increase in time would be required. The saving in unloading cost might more than compensate for the loss in grinding efficiency.

To maintain grinding efficiency it is obviously necessary to maintain the quantty of the balls or pebbles at the correct value. Different methods may be employed. Each month the mill may be emptied, the broken and undersized pebbles removed, and enough new pebbles added to restore the correct quantity. Another method is, after an experimental test to find the loss, add a small quantity daily to maintain the required proportion. With this method also periodic inspection is required. Obviously the pebbles added must be scrupulously clean.

Strict Adherence to Programme

It is a *sine qua non* of good milling practice to ensure that strict adherence to the standard programme is maintained once that has become established. This applies to the weighing of the charge, the renewal and sizing of the pebbles, the speed of rotation of the mill and the duration of the grind. Directly coupled mills have an advantage in this respect in that belt slippage is eliminated. Revolution counters or other timing devices have also been found of service in maintaining grinding routine and uniformity. However, they cannot dispense with the necessity of sampling and testing the fineness of the enamel before running it off.

The best conditions for wet grinding are, as stated, those which allow of the maximum use of the grinding surface of the pebbles by a process of rubbing. The best conditions for dry grinding are not so obvious. It may be conceded that where the material to be ground is initially of a fair size (1 or 2 inches in diameter, for example) and is tough rather than brittle, then the maximum percussive action is required. This is attained by rotating the mill at such speeds that the balls are projected from the periphery and fall the maximum vertical distance on to the material and crush it by impact. Various workers have investigated this problem mathematically and obtained formulæ for the speeds of rotation which agree with practice. Such speeds are considerably in excess of wet grinding speeds. In fact, the loss of energy from splashing would make such speeds out of the question for wet grinding.

It is suggested, however, that in grinding a material such as enamel frit by the dry process, a material which is brittle and relatively easy to reduce in size, more success would be achieved by running at wet grinding speeds. For at the higher speeds such as are normally used in dry grinding to obtain maximum impact, the charge and pebbles are open and loose and very little rubbing action can occur. At wet grinding speeds the charge and pebbles are coherent and compact, and maximum rubbing occurs. The conditions for best dry grinding of enamel would, therefore, appear to be very closely akin to those for wet grinding, more particularly as regards the size of the balls or pebbles, the amount of grinding media, and the volume of the dry charge. The speed of rotation may even be rather less than for wet grinding, owing to the reduced slippage on the walls of the dry charge as compared with the wet one.

Lead and Zinc Pigments

United States Statistics for 1935

SALES of all lead and zinc pigments in the United States were higher in 1935 than in 1934. The upward trend in lead pigments marked a continuation of that in 1934, while the trend in zinc pigments was a reversal of the downward movement in 1934. The average values received by producers of virtualy all pigments declined in 1935, those of zinc falling more than lead. Tonnage increased in sales, however, were sufficiently large to bring about higher total values of all pigments. The total value of lead pigments was $28,064,000 in 1935, compared with $24,002,000 in 1934, an increase of 17 per cent. The total value of zinc pigments was $26,500,000 in 1935, compared with $24,106,000 in 1934, and increase of 10 per cent.

The lead pigments as a whole enjoyed their best year since 1930. Sales of white lead (dry and in oil) registered the largest proportionate increase in 1935, but this industry had suffered more severely than the others. Whereas sales of white lead were the highest recorded since 1931, those of red lead were the largest since 1930 and those of litharge were the largest since 1929.

There were noteworthy increases of 14 and 46 per cent., respectively, in sales of zinc oxide and leaded zinc oxide in 1935, following declines of 12 and 10 per cent., respectively, in 1934. Sales of zinc oxide were the largest recorded since 1930, and those of leaded zinc oxide have been exceeded in only two or three previous years. The average prices for French process zinc oxide were reduced sharply in early October, 1935. Lithopone sales were 10 per cent. higher in 1935 than in 1934 and were the largest recorded since 1930.

The Belgian Chemical Industry

A Survey by the Belgian Overseas Trade Department

THE Belgian Overseas Trade Department in Brussels is giving publicity to various Belgian industries by distributing brief monographs in English, with lists of manufacturers included as appendices. These monographs may be obtained from the Belgian Commercial Counsellor at 103 Eaton Square, London, S.W.1.

According to the monograph on the Belgian chemical industry the works of a number of the Belgian chemical manufacturers are located in the highly industralised Sambre and Meuse regions, a location which is explained by the presence, in these districts, of numerous glass works, as well as of zinc works, which provide an important local market. Others are established near large urban districts, and close to inland waterways, ensuring a low cost of delivery of raw materials and of fuel, as well as of transport of their products, *i.e.*, in the vicinity of Antwerp, Ghent, Brussels, Bruges and Louvain, whilst a few are also located within the Campine coal mining district, not far from the port of Antwerp and from the Rhenish-Westphalian coalfields.

Heavy Chemical Products

In Belgium, the heavy chemical engineering manufactures chiefly acids, sodium sulphate and carbonate, sodium chloride, caustic soda, and soda crystals, as well as coal by-products. Mention should nevertheless be made, for the sake of thoroughness, of superphosphates and sulphate of ammonia, lead white, zinc white, and lithopone, which are intentionally excluded from this group.

There are about twenty firms sharing in the production of ordinary sulphuric acid, for the purpose of which they make use of native zinc sulphide, with a high proportion of pyrite, the sulphur content of which is about 50 per cent., whereas the sulphur content of native zinc itself varies from 20 per cent to 30 per cent. The pyrite, after roasting, is sold to the blast furnaces and cement works. In many industrial establishments mechanically operated rotary ovens have been substituted for the hand worked ovens. The lead chambers have a yield varying from 1 lb. of 60° Bé acid per 4 cu. ft. of native zinc sulphide to 1 lb. of 53° Bé acid per 3¼ cu. ft. of pyrite. Certain intensively worked systems, put into operation in the course of the last few years, have allowed a much higher yield. The total capacity of the lead chamber systems throughout Belgium exceeds 14,000,000 cu. ft., and their average production during the last years before the war was about 400,000 tons of 60° Bé acid. It increased steadily from 1920 until 1929, when it exceeded 830,000 tons, 230,000 tons of which were exported. In Belgium the acid is employed for the manufacture of superphosphates, and sulphates of sodium, ammonia, iron and copper. Five factories are engaged in the manufacture of oleum, and sulphuric acids of various degrees of concentration, by the platinum catalytic process.

Nitric Acid Manufacture

Nitric acid is produced by the oxidation of ammonia. Five factories cater for the export trade, which, in 1927, reached 1,570 tons. The concentration of this acid varies from 36° to 48° Bé. On the basis of a quantity of liquid product of 36° Bé. concentration, the production now exceeds 15,000 tons, most of which is absorbed by the Belgian market for its production of sulphuric acid, nitro-cellulose and nitro-glycerine, and artificial silk.

Hydrochloric acid is produced, in larger quantities, by seven industrial establishments having a yearly output of about 100,000 tons. It is intended chiefly for the production of chlorides, glucose and gelatine. Exports range from some 6,000 to nearly 14,000 tons, year by year.

Industrial sodium sulphate, obtained through the decomposition of mineral salt by sulphuric acid, plays a very important part in the production of glass. The high development reached by the latter in Belgium is universally known, and the thirteen Belgian manufacturers, seven or eight of whom are engaged in exports, are unable to cope with the requirements of the national consumers. The reasons which oppose a further extension of the production consist of the difficulty of finding an outlet for the hydrochloric acid by-product. It is, therefore, found to be more convenient to import the complementary quantities which are required. In spite of these circumstances, over 17,100 tons were exported in 1929.

The Solvay Process

The Belgian Solvay process for the industrial manufacture of sodium carbonate enjoys a universal reputation. This commodity undoubtedly constitutes the key-stone of applied chemistry, and it may be stated, without fear of exaggeration, that most of the other branches of industry are extensively influenced by it, for it constitutes one of the raw materials of vital importance to a very large number of trades, such as the manufacture of glass, soap, dyestuffs, artificial viscose, silk, textiles, paper, and starch. It is also employed in the production of sodium borate bichromate, silicate and sulphite, as well as of caustic soda.

Caustic soda is produced in Belgium by three factories, one of which, of great importance, makes use of the so-called "mercury cathode" electrolytic method. The production exceeds 20,000 tons of lye at 38° Bé. and of pure caustic soda. The latter is employed chiefly in the manufacture of artificial silk and of high-grade soap. In 1929, exports amounted to 2,384 tons. Soda crystals, of 60 per cent. water contents, are produced by a score of small establishments, with an output of about 40,000 tons per year. This product, which is intended chiefly for household consumption, is exported only on a small scale.

Sodium chloride is produced, in powdered or in 10° Bé. solution form, by three Belgian companies. The electrolytic process is employed by the Solvay Co., and the Deacon method by the two other firms. In 1929, the total production exceeded 20,000 tons, and foreign customers purchased over 4,750 tons.

Coal Distillation

The distillation of coal has also reached a high stage of development in Belgium, and yields an extensive range of by-products. In 1904, only 900 recovery ovens were in existence, and the quantity of coal distilled was 1,700,000 tons. This activity, interrupted by the war, has since made steady progress, to such an extent that, by 1923, the production exceeded that of 1913 by 20 per cent. and that of the 1900 to 1910 period by 63 per cent. All Belgiun coke-producing firms, numbering over fifty, now carry on the recovery of by-products, and work a total of some 3,100 ovens, employing nearly 6,000 workers. The principal products recovered are coal tar, ammonia liquor, light oils and the products of their distillation, anhydrous ammonia, ordinary sulphate of ammonia, refined suphate of ammonia, crude naphthalene, refined naphthalene, pitch, etc. Many companies have also been established since 1924 for the manufacture of synthetic ammonia.

There are in Belgium about sixty factories producing vegetable oils, a large majority of which are engaged in the treatment of linseed alone. Others supply rapeseed oil, castor oil, palm oil, copra oil, etc. These establishments, which are generally located in Flanders, for instance, in the Antwerp district possessing a harbour providing admirable facilities for the delivery of raw materials and for shipments of products, have an output of round about 100,000 tons per year. In 1929 their exports reached a figure of 177,500,000 francs, including 72,400,000 francs for linseed oil and 51,900,000 francs for castor oil.

The Belgian glue and gelatine industry, although it is little known, is nevertheless the most important in the world, for it caters for nearly one-third of the requirements of the whole world. The inland consumption takes up only about 10 per cent. of its output. In 1929, exports of these commodities amounted to 102,000,000 francs, including 62,000,000 francs for glue made from bones and sinews.

Copper sulphate, produced by seven Belgian works using scrap and ingots from the Belgian Congo, is exported in large quantities. In 1929, about 18,500 tons of the commodity were sold abroad.

The production of radium commenced in Belgium by a quantity of approximately one gram, extracted from ores derived from deposits discovered in the Belgian Congo in 1915. Belgium has since become the most important source of radium supplies, her production amounting, in 1929, to 60 grams, equivalent to the demand from all parts of the world. Uranium oxide, a by-product of this industry, is utilised in the manufacture of high-grade steel alloys.

In Belgium, the pharmaceutical branch of chemistry existed, before the war, practically on a nominal footing only, and the country relied on imports from abroad for its supplies of most medicaments. The bitter experience of the period from 1914 to 1918 showed that such a situation was fraught with the gravest dangers. Strenuous efforts were therefore made, as soon as hostilities came to an end, to remedy this deplorable state of affairs. One of the obstacles which had to be overcome was the need to find a number of essential raw materials. Furthermore, the smallness of the national market restricted the choice of products to those for which at least a partial outlet could be found abroad, in spite of the protective measures with which this production is now hedged round in almost every direction. These obstacles, however, have now been largely overcome, for Belgium possesses not less than a score of enterprises engaged in the manufacture and export of these commodities.

The Belgian manufacturers of chemical products are organised into several professional unions, first and foremost amongst which is the " Fédération des Industries Chemiques de Belgique " (Federation of Belgian Chemical Industries), Palais du Midi, Boulevard Maurice Lemonnier, 132*a*, embodying in its turn several affiliated associations.

Death of Dr. H. A. D. Jowett

Manager of the Wellcome Chemical Works, Dartford

DR. H. A. D. JOWETT, manager of the Wellcome Chemical Works, Dartford, died on Monday morning from severe injuries sustained as the result of a collision on Gorse Hill, Farningham, between his car and a motor coach. The death of Dr. Jowett, following so closely on that of his chief, Sir Henry Wellcome, is another great loss to the British fine chemical industry.

Born on April 25, 1870, Dr. Jowett was a Dorsetshire man who resided chiefly in Lancashire until 21 years of age. Early successes included an open scholarship at the Royal Grammar School, Lancaster (1881), at which he was Queen's Prizeman (1884). After securing the distinction of the First Division both in the Matriculation and Intermediate Science Examination, London University, he gained the Jacob Bell Scholarship of the Pharmaceutical Society, 1891. Between February, 1892, and July of the same year Dr. Jowett had passed both minor and major examinations of the Pharmaceutical Society, obtaining distinctions in practical chemistry, theoretical chemistry, botany and materia medica and winning the Pereira Medal and the Redwood Research Scholarship.

In 1893 he was elected Fellow of the Chemical Society and appointed Manchester Research Scholar at the research laboratory of the Pharmaceutical Society. In this year also he graduated B.Sc., London. In 1894 he was appointed demonstrator in the Pharmaceutical Society's research laboratory and assistant lecturer in chemistry in the Society's School of Pharmacy. He took his D.Sc. in 1895 and became Research Fellow of the Pharmaceutical Society in the following year.

His association with the Wellcome Foundation, Ltd., commenced 40 years ago when in September, 1896, he was appointed to the staff of the Wellcome chemical research laboratories and held the position for 10 years. He contributed numerous papers to the chemical and other scientific societies.

In 1905 Dr. Jowett was appointed chief of the experimental department of the Wellcome Chemical Works, Dartford, and in the following year became works manager, a position which he held with great success. He was, in fact, on the way to commence his week's work at Dartford when death came tragically as the result of the motoring accident.

Distinguished as he was in research, Dr. Jowett combined with that distinction the rare ability to direct and manage manufacturing on a large scale. He made many contributions to our knowledge of medicinal alkaloids, notably hyoscine, hyoscyamine, atropine, and his work on jaborandi and its chief alkaloid pilocarpine is historical. Other researches were undertaken to solve problems connected with the chemical constitution of cascara bark, salicylic compounds, commercial chrysarobin, epinephrine, etc. Allied to his ability in research was a gift of invention freely exercised and covering a wide range of subjects in the fine chemical industry.

Dr. H. A. D. Jowett.

The war period saw Dr. Jowett's genius in chemistry and organisation exercised to the fullest degree on behalf of his country and his firm. During this period the Wellcome Chemical Works produced the first British Salvarsan (" Kharsivan ")—this within a few months of the outbreak of hostilities. There followed " Neokharsivan," the first British Neosalvarsan, and numerous other chemicals of vital importance to the Empire.

Since the war Dr. Jowett's scientific attainments greatly helped to maintain supremacy in the quick and reliable production of insulin and original preparations of digitalis, ergot, etc., which are essential in modern medicine. Dr. Jowett took an active part in local municipal affairs, and was for some years a member of the Dartford Borough Council. He leaves a widow and two children.

Chemical Industry Finance

By S. HOWARD WITHEY, F.C.I.

DURING the financial year to the end of March last, a gross trading profit of £933,455 was made by Boots Pure Drug Co., Ltd., representing a decrease of £11,285 in relation to the previous year's figure, and after charging repairs, depreciation and fees the balance of net profit proved to be £770,889, which compares favourably with £750,037 realised in 1934-35. In addition to the dividend of 24 per cent., the bonus of 5 per cent. has been maintained, and the reserves have been increased by £172,141, the sum of £100,000 having been allocated to the general reserve and £17,948 to the property reserve. The contingencies reserve receives £54,193, and the carry-forward has been raised from £260,092 to £298,089. The entire authorised share capital of £3,000,000 ranks for dividend, comprising the following:—£10,000 in "A" preference £1 shades; £25,000 in "B" preference shares of £100; £100,000 in "C" preference £1 shares; £120,000 in "A" preferred ordinary £1 shares; £245,000 in "B" preferred ordinary £1 shares; £400,000 in "C" preferred £1 shares; £500,000 in "D" preferred shares; and £1,600,000 in the form of ordinary shares of 5s. denomination.

Soap and Candles

During the same period, J. C. and J. Field, Ltd., soap and candle manufacturers, etc., made a net profit of £30,143. This figure compares with £19,537 disclosed in the previous account, and enabled the directors to declare a dividend of 12½ per cent., less tax, and a bonus of 50 per cent., tax free, from the reserve. No special transfer was made to the reserve which a year ago received £4,000, and at £10,758 the carry forward is £769 higher. The issued share capital is £250,000, and at the date of the balance sheet a total of £188,541 had been called up, but the balance of £61,458 has since been called up.

Pharmaceuticals and Essences

The figures submitted by W. J. Bush and Co., Ltd., covering the past twelve months' operations, reveal a gross trading profit of £115,409, including dividends received. This represents an increase of £10,753, and after charging debenture interest, depreciation and directors' fees, the balance worked out at £98,363, as against £87,858 in 1934. The entire authorised share capital of £375,000 has been issued and paid up, consisting of £125,000 in 5 per cent. cumulative £5 preference shares—the dividend on which is paid half-yearly in April and October—and £250,000 in the form of ordinary shares of £1 each. The rate of dividend on the ordinary shares has been maintained at 13 per cent., absorbing £32,500, and the carry forward raised from £94,625 to £102,133. Properties and plant were valued for balance sheet purposes at £304,318, while the current assets in the form of book debts, cash and bills aggregated £586,905.

The audited accounts of Sangers, Ltd., manufacturing chemists, were made up to March 31st, disclosing a trading profit for the year of £188,723, which is very satisfactory in relation to £156,370 realised during the preceding twelve months. The net profit balance amounted to £146,040, as against £118,677, enabling the ordinary dividend to be increased from 22½ per cent. to 25 per cent., and an increased amount to be carried forward to the next account. At the balancing date, the issued share capital amounted to £1,114,500, but the balance of unissued capital, amounting to £35,500, has since been issued, making a total of £1,150,000, made up as follows:—£360,000 in 5½ per cent. preference shares; £250,000 in 7½ per cent. preference shares; and £540,000 in ordinary shares. It is the intention to increase the authorised capital to £1,250,000 by the creation of 400,000 shares of 5s. each.

Forster's Glass Co., Ltd., realised a profit of £70,433 during the year to the end of March, before providing for depreciation. This is only a very small decline in relation to the previous year, and owing to a lower charge for directors' fees, interest and income tax, the balance of net profit was higher at £41,842. Consequently, the dividend on the ordinary shares was maintained at the rate of 10 per cent., and after placing £18,000 to reserve, or £1,000 more than a year ago, there remains a credit balance of £11,492 to be carried forward, as against the sum of £11,025 brought in. The reserve now amounts to £95,000, and of an authorised share capital of £350,000 a total of £292,500 has been issued, comprising £175,000 in 7½ per cent. cumulative preference £1 shares—the dividend on which is paid half-yearly in March and September—and £117,500 in ordinary shares of 10s. There are also two issues of debentures. In the case of Webb's Crystal Glass Co., Ltd., the net profit for the past year worked out at £12,400. This result compares favourably with the four preceding years, and a dividend of 5 per cent. was announced on the participating ordinary 5s. shares. This took £4,665, so that the carry forward has been increased to £8,645.

Chemical and Glue Products

The profit of £87,016 made by British Glues and Chemicals, Ltd., during the financial year to April 30, compares with £71,771 revealed in the previous tabulation. The figure of profit was arrived at after providing for the cost of goodwill of businesses acquired during the year, and allocating £15,000 to contingencies, including fluctuations in the prices of materials. Against it was debited income tax and fees, while the book value of machinery and plant was reduced by £5,000, the net profit being down at £76,841, as compared with £46,711. A dividend at the rate of 7½ per cent. was paid on the ordinary shares, and after transferring £20,000 to the reserve there remains a balance of £35,307 to go forward, as against £36,217 brought in. Of an authorised share capital of £2,000,000, a total of £700,000 ranks for dividend, composed of £525,000 in the form of 8 per cent. cumulative participating preference shares of £1, and £175,000 in ordinary shares of 4s. each. The reserve fund now amounts to £80,000

Despite keen competition, the report of the Cape Asbestos Co,. Ltd., showed an improvement, the gross profit expanding from £58,720 to £67,353, and the net profit from £25,503 to £31,461. The dividend on the ordinary shares has been raised from 6 per cent. to 8 per cent., and the preference dividend from 11 per cent. to 13 per cent., leaving a balance of £15,942 to be carried forward. The authorised share capital of this company is £300,000, of which a total of £250,000 has been issued and paid up, consisting of £125,000 in the form of 5 per cent. cumulative preference shares, and £125,000 in ordinary shares, all of £1. The reserve fund amounts to £135,000.

POTASSIUM permanganate production in Japan is reported to be confined to two firms, namely, Nippon Soda Company and Nippon Seiren Kaisha. The former makes about 15 metric tons monthly (5 tons being consumed by the company), and the latter 45 tons monthly, to be increased to 60 tons monthly, because of increased export business.

IT is reported that shipments of phosphate rock from Morroco during 1935 exceeded the quota allotted under the terms of the cartel formed in 1933 by French North African producing entities. At a recent meeting in Paris a protest was registered by Algerian and Tunisian interests, which maintained that the practice of indemnification for over-shipments was intended only for exceptional cases involving small tonnages Protests were accepted, and it is expected that more harmonious relations will be established.

Manufacture of Lubricating Oils from Coal

Condensation of Olefines and Chlorinated Hydrocarbons with Aromatic Hydrocarbons

THE manufacture of lubricating oils from coal, chiefly by means of decomposing hydrocarbons from coal after first chlorinating them is described in "Deutsche Berwerks Zeit," January 26, 1936.

The decomposition by heat of chlorinated hydrocarbons yields gum-like products, tars, drying oils, or lubricating oils, according to the raw material and the reaction conditions. In this decomposition the chlorine is removed chiefly as hydrochloric acid, and the usual ring-forming and polymerisation of the originating unsaturated compounds results. Most of the investigations in this field have been employed on chlorinated paraffins, which paraffins have been obtained from low temperature tar, brown coal tar, or direct from the Fischer-Tropsch synthetic process. The chlorination is effected by leading chlorine gas at a suitable temperature into a closed vessel containing the hydrocarbons, the latter being meanwhile kept in agitation. Iodine acts to accelerate the reaction, and the presence of metals such as iron, copper and aluminium aids in the decomposition of the chlorinated compounds. These compounds can be decomposed by heat alone between 250 and 350°C., or in the presence of aluminium chloride as catalyst at a lower temperature.

The Fischer-Tropsch Process

The "Kogasin" produced in the Fischer-Tropsch synthesis, with boiling points over 220°C., can be chlorinated and then decomposed in the presence of activated aluminium at 130°C. to lubricating oil. After 1-2 hours an active development of hydrochloric acid sets in, and the reaction is complete in from seven to fifteen hours, according to the chlorine content in the material being treated. The viscosity of the products is comparable to that of good lubricating oils. With higher temperatures, however, the quality of the oils appears to be adversely affected. While polymerisation is the coalescence of similar molecules to form larger molecules of the same chemical composition, condensation is the combining of unlike molecules. Many investigators, using aluminium chloride or boron fluoride, etc., have sought to use cracked light oils as the olefine-containing raw material, and also fractions from benzol recovery, for condensation to lubricating oils. The reaction can be carried out either in the liquid or the gas phase. At Birmingham University the condensation of ethylene from naphthalene has been investigated, but this requires about 20 per cent. aluminium chloride; the temperature for the complete decomposition must be at least 250°C. At this temperature, the greatest and quickest condensation of the ethylene is obtained. The output of fractions comparable with lubricating oils is considerable, but there is always about 30 per cent. obtained as a gum-like residue. The oils thus produced have good viscosity and high breaking index; their stability against oxidation is smaller than that of mineral oil lubricants, although in oxidising they form no mud-like deposit. The maintenance of viscosity at relatively high temperatures is likewise small; the colour is good and the oils are rather free from gummy constituents.

A United States Product

Connected with the Friedel-Craft synthesis, the manufacture of "Paraflor," an effective lubricant, in the United States deserves mention. This product is made from chlorinated paraffin and benzol or naphthalene in the presence of aluminium chloride, and with a liquid hydrocarbon as diluting substance. This condensation product, mixed in small quantities with lubricating oils with too high drip point, has a surprising effect in reducing the drip point. Added in larger quantities it greatly improves the quality of a lubricating oil. The Friedel-Craft reaction is employed in order to produce lubricating oils from the higher boiling fractions of "Kogasin." Similar reactions can be carried out with metallic aluminium in place of the chloride; organic compounds are formed which contain aluminium and chlorine, and their decomposition with water and subsequent distillation lead to viscous products.

These new catalytic methods for the condensation of chlorinated paraffins is now being extensively investigated. It is known that long paraffin chains are valuable constituents of lubricating oils. All solid paraffins with melting points round 51°C. heated to 100°C with iodine and treated with chlorine gas give products with 10, 17.6 and 25 per cent. chlorine which about correspond to mono- di- and trichlor paraffins. It is true that the chlorination is not simple and complete, so that a product with 10 per cent. chlorine will also contain small quantities of di- and tri-chlorinated compounds.

Aluminium as Catalyst

These chlorinated paraffins have been condensed with different ring-hydrocarbons, with aluminium as catalyst; in all cases, 10 per cent. ring-hydrocarbons were added, and the aluminium was mixed with a diluting substance of suitable boiling point, this being used to make it easier to control temperature and also to mix in solid ring-hydrocarbons like naphthalene. The reaction requires rather high temperature and the employment of a light oil as a diluent. The mono- and di- chlorinated paraffins condense with benzol, toluol and homologues; the reaction requires a lower temperature with a liquid ring-hydrocarbon like benzol, and petrol-ether is a suitable diluent. The mono-di-paraffins yield with benzol, toluol and naphthalene solid wax-like products with a drip point of about 85°F.; the tri-chlorinated paraffin, on the contrary, yielded with the same aromatics clear viscous oils which possessed in a high degree the characteristics of lubricating oils.

The density and viscosity of the oils produced from the trichlor paraffins depend very much on the ring-hydrocarbons employed in the condensation; the stability of the viscosity by rising temperature is high in all cases. The outputs obtained with aluminium as catalyst are up to 70-80 per cent. conversion. Tri-chlor paraffin and naphthalene with aluminum chloride as catalyst, react violently and the end-product is a black gum-like mass. The employment of metallic aluminium as a catalyst results in the production of high grade oils and about 20 per cent. of a heavy black gum which contains organic compounds of aluminium. In subsequent condensations, this gummy substance can be used several times as the catalyst. The colour of the end-products depends very much on the completeness of the separation of the black compounds formed. The colour can be extracted from these gums by solvents and the oils then produced are water-white with a strong fluorescence.

THE General Chemical Group of Imperial Chemical Industries, Ltd., has nearly completed its production concentration programme. Of the thirty plants belonging to the companies merged in 1927, fourteen have been closed as manufacturing units, and nine have been amalgamated with other works, reducing manufacturing operations to seven works known as Billingham South, at Billingham; Castner-Kellner, at Runcorn; Gaskell-March (including Wigg-Kemet) at Widnes and Runcorn; Netham works, Bristol; Oldbury (including Wednesbury and Stafford), at Birmingham; Pilkington-Sullivan works at Widnes; and the St. Rollox works, at Glasgow.

Forty Years of Vegetable Fibre Investigation

Dr. Ernest Goulding Reviews the Work of the Imperial Institute

DR. ERNEST GOULDING, who retired last autumn from the post of vice-principal of the Plant and Animal Products Department of the Imperial Institute after thirty-nine years' service, delivered the Mather Lecture at the recent annual conference of the Textile Institute in London, his subject being "Textile Fibres of Vegetable Origin: Forty Years of Investigation at the Imperial Institute."

The Imperial Institute, said Dr. Goulding, was founded by public subscription as a permanent memorial of Queen Victoria's Jubilee in 1887. One of the principal functions it was designed to fulfil was that of assisting in the development of the natural resources of the countries of the British Empire. In pursuance of this aim a Scientific and Technical Department was established in 1894 and provided with large, well-lighted laboratories where the chemical composition and properties of raw materials of all kinds could be investigated. From its earliest days, however, the work of the Institute has been seriously hampered by lack of funds. There has therefore been only a comparatively small staff available for investigational work and for this reason it has been ruled that no research of an academic or fundamental character may be undertaken, but that the work should be restricted to problems likely to yield results of direct practical application.

Thousands of Samples Examined

During the last forty years some thousands of samples of vegetable textile fibres have been examined, emanating from all parts of the British Empire as well as from many other countries. Some of these samples have represented fibres derived from indigenous wild plants met with by agricultural officers or others in the country of origin—fibres which had not been examined previously but which it was considered might possibly be suitable for use in industry. Such fibres were examined in the Institute's laboratories to determine their chemical and physical characters and then, if found to be at all promising, were submitted to commercial experts for an opinion as to their suitability for industrial uses, their marketability and the prices they would be likely to realise. Other samples have represented fibres already known to commerce but grown experimentally in a new country with a view to determine whether such crops could be introduced on a large scale to form the basis of an agricultural industry. Other samples again have been submitted to the Institute as resulting from experiments undertaken with the object of improving the quality and value of fibre crops already under cultivation.

Investigations have also been carried out in relation to the comparative tensile strength of different fibres and the rate of deterioration of the strength on exposure to fresh or salt water, whilst yet other work has been concerned with the influence of storage conditions on the quality, composition and strength of the materials. Much of the more recent work has been helped and encouraged and, in some cases, initiated by the Institute's Advisory Committee on Vegetable Fibres which, since its formation in 1926, has been ably presided over by Mr. Alfred Wigglesworth.

At the beginning of the present century the danger to which the British cotton industry was exposed by its dependence on the United States for its raw material led manufacturers to consider the possibility of obtaining supplies from other sources. Work accomplished by the Imperial Institute included not only the examination of the quality and defects of specimens of cotton from nearly all the governments of the tropical Colonies and Protectorates as well as by spinners and the preparation of reports and recommendations thereon, but in addition the conduct of special investigations connected with such collateral subjects as the best method of disinfecting cotton seed, the identification and control of insect and fungus pests which attack the cotton plant, and the analysis of soils.

Dr. Ernest Goulding.

After the war the assistance of the Institute was in less demand owing to the formation of the British Cotton Industry Research Association in 1919 and the establishment in 1921 of the Empire Cotton Growing Corporation.

Attempts which have been made from time to time to test the possibilities of flax production in countries of the British Empire have been carefully followed at the Imperial Institute. One of the most interesting of these attempts is that which was made in Kenya Colony. Some attention has also been given by the Imperial Institute to the possibility of developing a flax industry in Cyprus. The flax plant has been cultivated in the island from early times but mainly as a source of linseed.

Linseed Straw Fibre

In connection with the subject of flax, reference may be made to inquiries received at the Imperial Institute regarding the possibility of utilising the fibre contained in linseed straw, enormous quantities of which are produced in the Argentine and other linseed-growing countries. After the linseed has been harvested the plants are usually destroyed by burning. This appears to be a very wasteful procedure as the straw contains much useful fibre. Many attempts have been made to extract this fibre in a suitable form for the flax spinner, but the product obtained has been composed of short, coarse strands and is consequently of comparatively little value. During recent years, however, the Imperial Institute has been consulted concerning processes which have been devised for treating linseed straw in such a way as to extract the fibre in the form of its ultimate elements. These are called "cottonisation" processes, as the ultimate flax fibres obtained are rather more than an inch long and can be spun either alone or mixed with cotton on ordinary cotton machinery, slightly modified for the purpose. One such process, invented in Germany, has been applied to the manufacture of fabrics termed "half-linen," which consist of a mixture of "cottonised" flax and cotton.

In 1928 an investigation of Indian (Sunn) hemp was directed to the determination of its resistance to the action of water in comparison with that of true hemp. This work was undertaken with the object of ascertaining the accuracy or otherwise of the opinion then commonly held in manufacturing and trade circles that Indian hemp is much inferior in this respect to the European hemps.

One of the earliest researches at the Imperial Institute was

undertaken with the object of ascertaining the quality of the jute fibre obtainable from plants at different periods of growth. For this purpose a special series of samples were collected at Rahuta, a village twenty miles north of Calcutta. They represented the fibre obtained from stems cut (1) before flowering, (2) after budding, (3) when in flower, (4) when in pod, and (5) when fully matured. The results of chemical examination showed that the samples did not vary greatly from one another in composition and thus indicated that the fibre does not undergo any sudden change at critical stages in its life history. There was, however, considerable difference in the appearance, colour and fineness of the samples, the earliest specimens being superior in all these respects to those gathered at later periods. In general it would appear that during growth the fibre becomes gradually less lustrous, coarser, harsher and more brittle. This fact seems to be realised in India as the crop is usually regarded as being in season when the flowers appear and to be past season when in fruit, and it is considered that the later the stems are cut the coarser is the fibre. Since the date of that investigation, similar observations at the Imperial Institute have been repeatedly made, with both jute and related fibres, and these confirm the view that the fibre deteriorates as the age of the plant increases.

Manila Hemp

Experiments have been made in several parts of the Empire in connection with the production of Manila hemp, the fibre of *Musa textilis,* and many samples have been received for examination and report. A problem of some commercial importance was placed before the Imperial Institute in 1921. At that time certain consignments of Manila hemp arriving in the United Kingdom were found to be very deficient in strength. Samples of the defective fibre were provided by Wigglesworth and Co., Ltd., for examination with a view to the discovery of the cause of the inferiority. They were submitted to chemical tests and analysis and the results indicated that the fibre had been affected by some fermentative process leading to degradation of part of the cellulose with formation of decomposition products soluble in water and an increase in the amount of matter soluble in hot dilute alkali and in acetic acid. This was supported by the fact that the weaker and more damaged the fibre, the lower was the percentage of cellulose present and the greater the loss of weight on treatment with hot water, dilute alkali or acetic acid. Confirmation was obtained by exposing some of the damaged fibre to hot, moist conditions in the laboratory, when it was found that the cellulose underwent further degradation and the fibre became weaker. It therefore seemed clear that the damage that had taken place in the consignments of Manila hemp was due to degradation of the cellulose by bacterial fermentation, promoted by long storage in a moist condition at a tropical temperature, and it was pointed out that in order to avoid such deterioration the utmost care should be taken in the Philippines in drying the fibre and in ensuring that it is not stored or baled in a moist state.

Sisal Hemp

In the course of investigations on sisal the question arose as to whether there are any marked variations in the chemical composition of the fibre from different sources, and a detailed study was therefore made of a number of samples representative of ordinary commercial shipments. This involved the analysis of 27 samples, *viz.*, nine from Tanganyika, four from Kenya, four from Portuguese East Africa, and ten from Mexico.

Among other studies of sisal hemp at the Institute mention may be made of a series of experiments to ascertain the rate at which sisal and Manila ropes would develop mould or mildew under conditions similar to those of a ship's forecastle. It was found that in a moist atmosphere the sisal ropes used mildewed more readily than the Manila ropes, and evidence was obtained that in the case of sisal the mildewing is due to the presence of specific organisms on the fibre, which probably originated in the country of production. After immersing the ropes for a short time in sea-water, the sisal rope no longer showed a greater tendency to become mildewed than the Manila rope, and it would therefore seem that the specific organisms on the sisal are eliminated by exposure to sea-water.

Bowstring Hemps

Another class of fibre suitable for cordage manufacture comprises those known as " bowstring hemps " obtained from the leaves of various species of *Sansevieria* (natural order *Liliaceae*). These plants are abundant in tropical Africa and the fibres of several species have been examined at the Imperial Institute, includinug those of *S. guineensis, S. Ehrenbergii, S. cylindrica, S. fasciata, S. sulcata, S. Stuckyi* and *S. volkensis.* The quality of the fibres of the different species varies greatly, that of *S. guineensis* consisting of fine, lustrous, strong strands of even diameter whilst the strands of *S. Ehrenbergii* show a very marked variation in diameter, those from the interior of the leaf being extremely fine whilst those from the exterior are very coarse. In 1905 the extraction of fibre from plants (chiefly *S. Ehrenbergii*) growing wild over extensive areas in Kenya was undertaken on a commercial scale, a factory being erected and equipped with machinery similar to that used for extracting sisal hemp. The fibre was, however, of rather unsatisfactory quality and after a few years its production declined, attention being transferred to the cultivation of sisal hemp. Samples of *S. guineensis* from West Africa and other countries have been found at the Imperial Institute to be of excellent quality, but in order to create a profitable industry in this fibre special machinery would be required as the leaves are thin and flat and the fibre is therefore less easily extracted than in the case of thick leaves, such as those of *S. Ehrenbergii.*

Miscellaneous Fibres

There are a number of other fibres to which attention has been devoted at the Imperial Institute. The question of ramie (the fibre of *Boehmeria nivea,* a plant of the *Urticaceae* or nettle family) has been raised over and over again at short intervals. Samples of the product from many parts of the Empire have been submitted for examination, and numerous specimens of fibre prepared by different methods (generally supposed by their inventors to be new and superior to all the methods devised previously) have been forwarded for report. In all cases it has been necessary to explain that ramie spinners are not disposed to purchase supplies except in the form of hand-cleaned China grass, which is prepared in China by a tedious process that can only be employed where very cheap labour is available, and that profitable production in other countries seems to be impracticable. Moreover, new processes of preparing the fibre are not needed, as spinners degum the product by chemical methods developed in their own factories and will not readily change to any other system. The Imperial Institute has therefore found it necessary to advise planters overseas not to grow ramie unless they are able to assure themselves in advance of a remunerative market for their crops.

A palm fibre of a particularly interesting character was received in 1905 through the Foreign Office from the British Legation in Paraguay. This so-called " vegetable wool " was said to have been prepared from the leaves of a palm growing abundantly in that country and to be obtainable in large quantities. As in the case of the palm fibres already mentioned, however, the cost of extraction by hand would be too great to enable it to be profitably exported. This product was a fine, cream-coloured fibre consisting of filaments of about the same diameter as those of the oil-palm fibre (0.002-0.005 inch) but not so strong. It was remarkably harsh and rough to the touch and microscopical examination showed that this property was due to the presence of minute external excrescences. It was considered by experts that the product would probably be useful for the manufacture of twine or coarse thread or as a material for matting and carpets.

Accidents in the Chemical Industry

Experience in the United States during 1935

VERY creditable reductions in both accident frequency and accident severity rates were made by the chemical industry in the United States during 1935, in comparison with rates for 1934, according to reports by the National Safety Council. These reports cover the experience of 282 plants whose employees worked 240,396,000 man-hours.

The 1935 average frequency rate of 9.53 (the number of disabling injuries per million man-hours of exposure) is 13 per cent. below the rate for 1934; and the average severity rate of 1.03 (the number of days lost per thousand man-hours of exposure) is 44 per cent. below the 1934 rate. Thus the chemical industry, in a list of 30 major industries, now ranks tenth in frequency, and is tied for tenth in severity of accidents with the miscellaneous metal products industry.

Substantial Improvements During the Year

Frequency of disabling injuries in chemical plants reporting to the National Safety Council has decreased 64 per cent. since 1926, and in severity the decrease has been 51 per cent. These rates compare favourably with reductions of 61 per cent. and 43 per cent. for all industries in the same period. As a result of the substantial improvements during 1935, the chemical industry, according to State reports are "handling rates made since 1926 by all industries combined. Large plants had the lowest 1935 frequency rates and small plants the best records in severity. Large plants, on the whole, made the largest improvement over 1934.

Of the various branches of the industry manufacturers of carbon products had the lowest frequency rate, 3.96, and manufacturers of photographic film and chemicals had the lowest severity rates, averaging 0.22. Coal tar distillers made the best showing in frequency in comparison with 1934 by achieving a reduction of 48 per cent.; manufacturers of alcohol and solvents made the largest reduction in severity —85 per cent.

Compensatable Accidents

The most important types of compensatable accidents in the chemical industry, according to state reports are "handling objects" and "harmful substances" which account for 40 per cent. of all types. Small plants had the highest frequency rates, but the lowest severity rates during 1935. The largest reduction in frequency over 1934 was made by small plants, but credit for 1935 results by the entire industry belongs, on the whole, to large plants. Both injury rates increased over 1934 in plants producing plastics, salt, and vegetable oils. The largest increase in frequency occurred in vegetable oil manufacturing plants and the largest rise in severity occurred in the chlorine and alkali classification.

Industrial Group	1934-1935 Change in *Frequency*	1934-1935 Change in *Severity*
Entire industry	−13%	− 44%
Coal tar distillers	−48%	− 25%
Industrial gases	−42%	− 4%
Dye manufacturing	−36%	− 84%
Explosives manufacturing	−35%	− 77%
Chlorine and alkali manufacturing	−33%	+143%
Soap manufacturing	−29%	− 83%
Not otherwise classified	−11%	− 10%
Fertilizer manufacturing	−11%	− 36%
Carbon products	− 7%	− 18%
Paint and varnish manufacturing	− 4%	+314%
Photographic film and chem.	− 3%	− 56%
Pharmaceutical and fine chemicals manufacturing	− 2%	− 57%
Alcohol and solvents manufacturing	+ 2%	− 85%
Plastics manufacturing	+ 5%	+ 35%
Acid manufacturing	+ 5%	− 31%
Salt manufacturing	+13%	+ 36%
Vegetable oil manufacturing	+15%	+ 94%

Repair and maintenance employees had about 30 per cent. of the 81 serious injuries reported. Operators of various types of machines and chemical apparatus, however, were involved in almost as many accidents, and of the other occupations, labourers figured in the most fatalities and permanent partial disabilities. The principal agency of injury was machinery—such as presses, pumps, and fans. Vehicles, elevators and hoisting apparatus, and pipe and pressure apparatus figured in five or more serious injuries. Automobiles and trucks were involved in several serious injuries. Chemicals, such as sulphuric acid, explosive materials, and strong alkalies were involved in eight fatalities and permanent disabilities.

Hazardous Arrangement

"Hazardous arrangement" was assigned as the principal mechanical cause in one-fourth of the serious injuries. A foreman, for example, attempted to step from a platform on to a portable ladder, lost his balance and fell, fracturing his skull. The next important mechanical cause was "defective substances or equipment." Two employees were fatally overcome by benzole fumes when a cock on a storage tank broke. In another case, an employee was electrocuted due to contacting the frame of a motor, heavily charged by a lead from which the insulation was worn. "Improper guarding" was assigned to fourteen serious injuries. An employee lost three fingers due to getting them caught in the unguarded gears of a winch. In another case, an employee removed a guard and lost parts of four fingers when they were caught between a belt and a pulley. Disobedience of instructions, chance-taking and other wrong attitudes on the part of employees were involved in almost one-half of all serious injuries. The operator of a retort, for example, lost a finger when he failed to use a door opening tool as instructed. "Lack of knowledge or skill" was also an important personal cause of serious accidents.

Heat Insulation for Furnaces

Moler Products, Ltd., acquired by General Refractories, Ltd.

THE works at Colchester, owned by Moler Products, Ltd., and engaged in the manufacture of heat and sound insulating partition blocks for use in buidings, and of heat insulating bricks for use in furnaces, kilns, ovens, etc., has been added to the list of works controlled by General Refractories, Ltd.—in this case through International Diatomite Co., Ltd. The works will be extended with a view to doubling the output. The company has its own diatomite deposits plant, harbour and wharves in the Island of Fur, off Denmark.

The directors have declared an interim dividend of 6 per cent., less tax, payable August 17. A similar payment was made in 1935, when the total dividend was 15 per cent., with a final of 9 per cent. Since last year the authorised capital of the company has been increased from £325,000 to £500,000, of which £450,000 is issued.

A NEW plant has been erected in Tscheljabinsk and all types of paint products will be manufactured. In addition to zinc oxide, and barium pigments, the new plant will manufacture titanium white and it is planned at the start to produce about 12,000 tons of pigment a year. The manufacture of dry colours will also be included and the initial output of the factory will be about 4,000 tons yearly. The quantity of enamels and varnishes will be in the neighbourhood of 5,000 tons.

Letters to the Editor

Works Laboratory Explosions

SIR,—In your "Notes and Comments" for August 1, you invite correspondence on industrial explosions. A friend of mine, a colour-shop foreman, in a printworks now closed by the Calico Printers' Association, having learned chemistry at the local evening classes, obtained a post in America as a research and experimental chemist. There engaged, whilst mixing a new colour (according to a German recipe containing Am.SCN and a chlorate) he had a very bad explosion, from the effect of which he was in hospital for several months, whilst all the windows in the laboratory were smashed. He ground some of the ammonium salt in a small mortar and threw this into a dish in which he was to mix the colour, and then, without wiping out the mortar, he put in about one ounce of chlorate. As soon as he began to pound it, it exploded with tremendous force. I repeated this experiment using just a crystal or two of Am.SCN and a few crystals of chlorate. It failed to explode because the ammonium salt was damp. I then dried some of it, when the first stroke of the pestle exploded the mixture, smashing the mortar (a 4 in. one) to pieces. In an article that I wrote on such matters I pointed out that chlorates should be kept separate and should be given their own particular scoops, which should be made of copper. Another explosion, at a works when the chlorate cask was never found and the man was very badly mutilated, I considered was due to the fact that he had used a scoop that had been previously used for $Ba(SCN)_2$.—Yours faithfully,

W. WARR.

An Opportunity for British Chemicals

SIR,—The 1936 register of the Apothecary's Control Laboratory of Stockholm shows that the import of British pharmaceutical and medical specialities occupies a low place. The figures give the number of manufacturers of different nationalities who import into Sweden and they read as follows:—Germany 109, France 34, United States 15, Great Britain 14, Switzerland 9, Austria 6, Hungary 5, Holland 4, Czechoslovakia 3, Canada 1, Brazil 1, Belgium 1.

There is in Scandinavia at the present time a very definite desire for British products and when they are offered they find a ready market. In looking through the register it is astonishing to find represented so few of the great names in the British fine chemical industry.

The regulations in regard to the import of foreign pharmaceutical products into Scandinavia are quite simple and by no means prohibitive, and they seem to present no difficulties to our foreign rivals. In drawing your attention to the excellent opportunities here presented I desire to add the constructive information that full details can be obtained by interested British manufacturers at this office.—Yours faithfully,

F. M. MANASSE,
London Manager,
"Nordisk Medicinsk Tidskrift"
(Scandinavian Medical Journal)

46 Southampton Row,
London, W.C.1.

The Chemical Age Lawn Tennis Tournament

Finals at East Ham on September 12

ARRANGEMENTS have now been practically completed for the finals of the sixth annual CHEMICAL AGE Lawn Tennis Tournament, which, through the kindness of Sir David Milne-Watson, are to be played at the sports ground of the Gas Light and Coke Company at Southend Road, East Ham, on the afternoon of Saturday, September 12. A number of invitations have been issued this week, and early application for tickets should be made by members of the chemical industry desirous of witnessing the finals. Applications should be addressed to the Editor of THE CHEMICAL AGE, Bouverie House, 154 Fleet Street, E.C.4.

In the third round of the singles C. G. Copp (Doulton and Co., Ltd.), defeated A. Cosgrove (Hanovia, Ltd.), 6—0, 6—3. A. Tickner (British Celanese, Ltd.) still has to meet R. A. J. Bennett (Nobel Chemical Finishes, Ltd.). In the fourth round A. Baxter (United Yeast Co., Ltd.) defeated L. F. Grape (Borax Consolidated, Ltd.), 3—6, 6—2, 6—2. The draw for the fouth round and semi-finals is as follows:

SINGLES

Fourth Round and Semi-Final.

Fourth Round. (To be played at once)	Semi-final. (To be played by August 31)
1. **Grape, L. F.**, Borax Consolidated, **v.** 2. **Baxter, A.**, United Yeast Co. Ltd.,	**Baxter v.**
3. **Copp, C. G.**, Doulton & Co. Ltd., **v.** 4. **Hanson, G. A.**, Whiffen & Sons, Ltd.	**3 or 4**
5. **Gough, C. C.**, Lever Bros., Ltd. **v.** 6. **Williams, R. M. O.**, Chance & Hunt Ltd.	**5 or 6**
7. **Tickner, A.**, British Celanese, Ltd., or **Bennett R. A. J.**, Nobel Chemical Finishes, Ltd. **v.** 8. **Goudie, A. W. A.** Tar Residuals, Ltd.	**v. 7 or 8**

A. Baxter was the winner of the singles cup in 1934, and C. G. Copp was the winner in 1933.

In the doubles tournament all the preliminary rounds have been completed, and the draw for the semi-finals is as follows:—

DOUBLES

Semi-Final.

(To be played by August 31)

Hayman, R. D., & Copp, C. G. Doulton & Co., Ltd.	**v.**	**Gough, C. C., & Williams, T. P.** Lever Bros., Ltd.
Willshere, A. E. C., & Grape, L. F. Borax Consolidated, Ltd.,	**v.**	**Prosser, V. J., & Baxter, A.** John Haig & Co., Ltd., and United Yeast Co. Ltd.

V. J. Prosser and A. Baxter reached the final in 1934 and A. E. C. Willshere and L. F. Grape were the runners-up last year. The present holders, F. G. Hawley and J. Haines (Anglo-Iranian Oil Co., Ltd.) have not participated in the tournament this year. Having won the cup three years in succession they have agreed to hand it back for permanent competition.

Mr. E. Glanvill Benn, director of Benn Brothers, Ltd., proprietor of THE CHEMICAL AGE, will present the trophies to the winners at the close of play. THE CHEMICAL AGE silver challenge cups will be awarded to the winners of the singles and doubles, respectively. Silver statuettes kindly given by Thomas Hill-Jones, Ltd., will be presented outright to the three winning players, and similar statuettes, given by Mr. W. Lloyd Willey, will be awarded to the runners-up.

NINE companies in Chile produced during 1934, 20,683 metric tons of sulphur, having an average sulphur content of 99.57 per cent. Preliminary figures for 1935 are placed at 20,110 tons of sulphur and 4 862 tons of sulphur ore. Chilean contribution toward international trade in sulphur has thus far reached only about 18,000 metric tons annually.

Welwyn Garden City

Sites for Chemical Factories

THE number of inquiries for factories and sites at Welwyn Garden City during July was less than the total for June but slightly more than May. The construction of a new factory of over 5,000 sq. ft. on a site of ¾ acre for the Harrow Chemical Co., has been commenced.

The short term option held by a world famous firm of chemical manufacturers on a five acre site on the estate was exercised during the month, and building operations will be commenced during the next month or two. This is the largest transaction of its kind on the estate since 1930. The number of manufacturers setting up new businesses at Welwyn is steadily increasing, and the increase on the total at January 1, 1936, is now over 18 per cent. Construction of twelve new ground floor factories has been commenced within the past few weeks.

Benn Brothers, Ltd.

Sir Ernest Benn on Our Service to Industry

THE fortieth annual general meeting of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, was held at Bouverie House on August 7.

Sir ERNEST BENN, who presided, said that the company's public to-day was the 600,000 employers of labour in this country. "In our editorial work," he continued, "we must always remember these 600,000 independent people who represent the solid mass for which we are working, and we must not try to get too much into the smart set. Journalistic stunts and habits which are all very well for the smart set, are simply irritating to the more serious, inarticulate public on which we depend, and for which we are working. We are not here really as journalists or advertising men. It is our work to produce journals true to the traditions of the editorial profession and to sell our advertising space, but that is incidental. We are the guides, counsellors and friends of the chemical manufacturer, the timber merchant, the tomato grower and other tradesmen whom we are serving. This places ours above the average journalistic and advertising job. We have to write and print for people who know what we are writing and printing about, and it is a quality, or limitation, however you like to regard it, that the popular journals in Fleet Street know nothing about."

Dealing with the financial position, Sir Ernest Benn said that the company had been on a level course for five or six years past. Some might say that it was a slightly too level course, but it was nothing to worry about, when it was remembered that during the last fifteen years the company had had a very rapid rise in its figures and that it had succeeded rather better than most in keeping on that higher level. What was important was that every figure in the accounts was, as always with Benn Brothers, Ltd., on a conservative basis, and there was not one shilling's worth of puff anywhere. In conclusion, he acknowledged the work of his colleagues on the board, and on his behalf and theirs expressed gratitude to the fine body of men and women who composed the staff. He made special mention of the Birmingham and Scottish offices of the company, which were setting a standard to the head office.

Mr. H. B. CROLE-REES, managing director, followed, and resolutions were passed approving the report and accounts, and declaring the final dividends which have already been published.

Mr. F. H. ELLIOTT, in moving a vote of thanks to the chairman, said that Sir Ernest Benn possessed the qualities of leadership which were respected not only in this country but overseas. The score of speeches which Sir Ernest had made during the recent Scandinavian tour of the Advertising Association had increased British prestige in all the countries which had been visited.

Motive and Method

Sir J. Stamp's Fernley-Hartley Lecture

SIR JOSIAH STAMP, in his Fernley-Hartley lecture for 1936 ("Motive and Method in a Christian Order," Epworth Press, 6s.), the first for many years to be delivered by a layman, illustrates the danger of confusing motive and method by relating how indignant the rector of his parish became when he (Sir Josiah) hesitated to take the chair at a local meeting advocating "Social Credit," the parson interpreting his attitude "almost as apathy in the Christian cause"! While disclaiming any intention of "proving" anything in this book, Sir Josiah suggests certain considerations which should precede the formation and preaching of views on economic questions.

It is fatally easy to assume that wholesale changes in method would necessarily bring about a better society, even if material needs could be effectively equalised—a point on which the author has grave doubts. "Long and earnestly," he says, "I have tried to conceive the practical way of making the supposed principle of the Vineyard (which, after all, was likened to the 'Kingdom of Heaven') work an economic society in a temperate zone, with a dense population, in such wise that it can be made an immediate goal of policy, in the facile way that some writers are able to do. But I have tried without success." He takes refuge in a resolve to use the principle of need to the utmost in social security, relative taxation, and personal relationships, but believes that the poor now get a better standard than would prevail under a short-sighted attempt at the closest equality.

Sir Josiah Stamp thinks that it will take many generations to raise the motive of the multitude of workers to any common higher plane of service, regardless of comparative personal reward. Yet the more businesses can use and press non-financial incentives of pride and self-respect, and the less the money reward incentive dominates the field, the easier will it be to make large transfers to the higher motives of a new order. In common with most thinkers, Sir Josiah recognises that the present order is changing, but it would have been interesting had he indicated the lines on which he thinks further progress will be most likely to succeed. There can be no escaping his conclusion that personal motive is fundamental. The book should be read by every business man who cares for more than the material side of his work.—J. A. B.

Imported German Machinery

Company Director Fined for Alleged False Declaration

FINES amounting to £500, with ten guineas costs, were imposed at the Mansion House on Monday on Gustav Adolf Ochs, managing director of the Pragos Engineering Co., Ltd., Brixton Road, London, S.W., for making false declarations as to the value of consignments of machinery imported by his company from Germany, and also for being concerned in attempts at evasion of Customs duties.

Mr. B. M. Stephenson, for the Commissioners of Customs and Excise, said that Ochs, as soon as he was found out, gave the authorities all the help he could.

Mr. Walter Frampton, defending, said that Mr. Ochs had been guilty more of extreme stupidity than of a deliberate intent to cheat the Customs. What he had done was to try and adjust monetary difficulties that had arisen as the result of this country going off the gold standard

The court accepted payment of £200 down, and allowed Ochs a month in which to get the balance.

CARBON bisulphide production in Japan during 1935 was approximately 60,000 metric tons, according to the Carbon Bisulphide Sales Guild. This represents a substantial gain over previous years. Chief outlet is in rayon manufacture.

Personal Notes

MR. ALEXANDER GRAINER, an official of Scottish Oils, Ltd., has died at Broxburn, after a long illness.

MR. GEORGE B. FORBES, of Craigton, one of the managing directors of the Craigton Bleaching Co., Milngavie, Dumbartonshire, has died at the age of 53.

MR. JAMES MACLEOD, F.I.C., M.I.Chem.E., manager of Gasgow Corporation Chemical Works Department, is due to retire on December 1, under regulations relating to age limit. The high appreciation of the services rendered by him during the past eleven years is to be placed on record by the Corporation.

MR. HENRY ROBERT GILLESPIE, of Carisbrooke Drive, Nottingham, a director of Boots Pure Drug Co., Ltd., died suddenly on Sunday afternoon after having attended church, apparently in good health, in the morning. He was a native of Nottingham, and was appointed chief accountant of the company about twenty-six years ago. Shortly after the war he was elected a director and was equally popular among directors, shareholders and employees. He was an elder of the Belgrave Square Presbyterian Church and hon. treasurer of the Nottingham Y.M.C.A. Mr. Gillespie had been subject to heart trouble but latterly he had enjoyed better health. He leaves a widow and one son.

MR. J. JARVIE, chief chemist of the Scottish section of the L.N.E. Railway, has retired after 36 years' service. The Scottish laboratories will close down with his retiral.

SIR AUSTEN CHAMBERLAIN will be the principal guest at the dinner of the National Lubricating Oil and Grease Federation to be held at Grosvenor House, Park Lane, on October 21.

MR. HENRY OSBURN GRIEVE, B.Sc., A.I.C., a native of Kirkliston, West Lothian, was married recently at the Roxburgh Hotel, Edinburgh, to Miss Tesley Margaret Anderson.

MR. H. BURMAN, second-class chemist with Glasgow Corporation Gas Department, has been promoted first-class chemist in charge of the benzole plant at Provan Gasworks at a commencing salary of £295 per annum.

MR. EMMANUEL MARCELLUS LUNDGREN, of Waverley, Cliffe Road, Barton-on-Sea, Southampton, and formerly of 64 Stanton Road, Stapenhill, Burton-on-Trent, brewer and chemist to Archibald Arrol and Son, Alloa, left gross estate valued at £6,320, with net personalty £6,304.

SIR JOHN CADMAN, chairman of the Anglo-Iranian Oil Co., Ltd., has been granted His Majesty's licence and authority to wear the Insigna of Grand Officer of the Legion of Honour conferred upon him by the President of the French Republic, in recognition of valuable services rendered by him.

Chemical Notes from Foreign Sources

France

NEW COMPANY FORMATIONS INCLUDE :—Société de Recherches et d'Essais "S.R.E.," 16 Avenue Hoche, Paris, 8; capital 25,000 francs (exploitation of chemical processes of all types, acquisition and exploitation of patents). Etablissements L.P. Bonifait and Cie., 17 Boulevard de Menilmontant, Paris; capital 20,000 francs; (abrasives and polishing materials).

Holland

ALTHOUGH ALUMINIUM IS USED ON A SMALL SCALE in Holland, the commission of experts deputed last year to inquire into the advisability of establishing a Dutch aluminium industry has now issued a favourable report. Its decision was influenced by the upward trend of consumption, by the availability of colonial raw materials and by the low price of electric current to be supplied by the Limburg Mines, in whose vicinity the contemplated works would be erected.

Russia

A NEW PLANT WILL SHORTLY BE PUT INTO PRODUCTION at the Neva chemical works for making sodium silicofluoride, at the rate of 2,000 tons per annum.

PETROLEUM IS THE STARTING MATERIAL for a new process of acetylene manufacture reported to have been developed in the Leningrad Industrial Institute and which is now being tried out on a semi-works scale.

PLANS FOR A MORE PROFITABLE EXPLOITATION of natural gas in the petroleum fields are being put in hand, according to a report by the chief engineer of the Naphtha Trust (quoted in the "Chemische Fabrik" of July 11). The annual production could be brought without difficulty to 6 or 7 million tons as compared with the present annual figure of about 2 million tons. With a view to utilising the natural gas resources of the Malgobek petroleum field, laying down of a pipe-line from there to Grosny has been projected and a sum of 300,000 roubles allocated for technical preliminary work. When the scheme is under way it is hoped to transport 200,000 cubic metres gas each day to Grosny.

Esthonia

A COMPANY HAS SECURED A 35 YEAR CONCESSION to exploit diatomite deposits of good quality near Narva.

PRODUCTION HAS NOW STARTED at the artificial leather factory at Dorpat, belonging to J. Morein and Co., Tartu.

Czechoslovakia

NATIVE-GROWN POPPY STRAW will shortly be utilised on an extensive scale by the Robert Heisler Chemical Works, at Chrast, near Chrudin, as a raw material for alkaloid manufacture.

A WIDE RANGE OF INTERESTS IS REPRESENTED on the directorate of a concern, now in process of formation, which plans the establishment of a coal hydrogenation plant in the Ostrau district. Utilising the Fischer-Tropsch process it is hoped to produce an annual total of 25,000 to 30,000 tons of benzine, propane, butane and wax. An initial outlay of 120 million crowns has been calculated, and the participating companies are the Witkowitz Iron Works, the Northern Railway, and the Wilczek and Larisch-Monnich Collieries.

Germany

ALPHA-METHYL ACRYLIC ACID is the starting material for the glass substitute known as Plexiglas, writes O. Röhm, "Chemiker-Zeitung," July 29. A process has been perfected for making very large bubble-free sheets of the methyl ester in thicknesses ranging from 5 centimetres upwards. Although indifferent to hydrofluoric acid, polymerised methyl methacrylate is attacked by sulphuric and nitric acids. Advantage is taken of its easy shaping qualities at elevated temperatures.

WITH A VIEW TO EXPLOITING the Pott-Broche coal extraction process, the Stinnes-Mulheim mining group has formed the Ruhröl A.G. with a share capital of 50,000 marks and the Ruhröl G.m.b.H. with a capital of 20,000. The main function of the latter company is the preliminary constructional and operating work in connection with coal treatment. Use will be made of plant originally erected by the Gesellschaft fur Teerverwertung for coal liquefaction by the Bergius process at Duisberg-Meiderich.

New Technical Books

CHEMICAL SYNONYMS AND TRADE NAMES: A Dictionary and Commercial Handbook. By William Gardner. Fourth edition. Pp. 495. The Technical Press, Ltd. 31s. 6d. net.

The fact that this dictionary contains about 25,000 definitions and cross-references should alone be sufficient to recommend it for the reference library in any industry where chemicals are used. Herein the works chemist, chief engineer, sales manager and technical director will find just that information which is not readily obtained elsewhere, or, if obtainable, in no way so concise. There are numerous cases where one particular material has several commercial designations—often the ill-begotten fancy name applied by the manufacturer—and it is not to be wondered that these various names give rise to considerable confusion amongst users of the material. What, for instance, are Abanone and Aba-odo? Is Zala any more poisonous than Zyclon? In all four cases they migh easily be the names of four of the Forty Thieves hiding in the great jars of the Sultan's palace, or four more ugly sisters of Cinderella, apart from the two of whom we read. Mr. Gardner, however, will quickly tell you that they are of interest to the baking powder manufacturer, the rubber industry, the housewife, and those who have need to destroy insect pests.

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A BRIEF COURSE IN QUALITATIVE CHEMICAL ANALYSIS. By Louis J. Curtman; pp. 249. New York: Macmillan Co. 10s.

As explained in the preface, this book is intended to provide both theory and laboratory work so co-ordinated as to furnish a sound scientific foundation for the student of chemistry, medicine, dentistry, agriculture and engineering. There is invariably room for yet another work of this description as long as new light is shed on an old but very valuable subject. At the outset it may be stated that Professor Curtman accomplishes this requirement with every success. The book is divided into four parts, of which Part I deals with theory, *i.e.*, the theory of Ionisation; Part II is concerned with the reactions of the Metal Ions and Acids; Part III considers schemes of analysis for Metal Ions and Acids, together with the systematic analysis of a simple substance; while Part IV explains various calculations involved in reactions. This completes the main body of information, though mention should also be made of the valuable appendix. The treatment of each of these parts is descriptive, and the illustrations, though few in number, serve to clarify certain points which otherwise would remain obscure. To many students, the crux of the work will be found in Parts II and III, and in this connection it is interesting to note the details of several modern reagents. For instance, there is a paragraph which deals with the reactions of the sodium ion. Magnesium uranium acetate, it is stated, gives with sodium solutions (not too dilute) a crystalline precipitate of sodium, magnesium, uranyl acetate. Potassium and magnesium do not respond to this test, which is capable of detecting 1 mg. of sodium in the presence of 100 mgs. of potassium. Professor Curtman then goes on to mention the well-known fact that sodium compounds impart a yellow colouration to the Bunsen flame, though he himself realises that this reaction is so extremely delicate that it reveals sodium in everything. To overcome this difficulty he suggests that the *relative* intensity of the flame colouration be considered. He fails, however, to indicate how this is to be accomplished. In the light of recent experience it might be suggested that the employment of a spectrometer would be of service. Perhaps Professor Curtman will consider such an instrument, not only for this purpose but in relationship to qualitative chemical analysis as a whole, and then give to the scientific world his experience in a subsequent edition. To sum up, it may be stated that within the small confines of some 240 pages a vast subject has been interestingly and, for the elementary purpose in view, adequately handled.

THORPE'S DICTIONARY OF APPLIED CHEMISTRY: Supplement By Jocelyn Field Thorpe and M. A. Whiteley, assisted by eminent contributors. 2 vols. Pp. 680 and 727. Longmans, Green and Co., Ltd. 60s. net.

The rapid advance in chemistry and its application to industry during the past decade rendered it desirable to bring the existing edition of Thorpe's Dictionary up to date by the preparation of three supplementary volumes. Two of these supplementary volumes cover subjects in alphabetical order; the third volume comprises a glossary and a comprehensive index to the supplementary volumes. In compiling these supplementary volumes, it has been assumed that the inquirer has access to the main work. The opportunity has therefore been taken to depart in certain instances from the usual dictionary style and to treat some of the subjects, in which definite advances have been made, as monographs. The object in view has been to make the articles as self-contained as possible, *i.e.*, make them readable accounts of the present state of chemical knowledge in the particular field with which they deal.

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PHENOMENES COLLOIDAUX. By René Dubrisay. Paris: Librairie Armand Colin. Pp. 186. 12 fr.

INTENDED mainly as an introduction to more advanced studies in colloidal chemistry and physics, Professor Dubrisay's text-book more than upholds the French reputation for lucidity in presentation of difficult scientific material. The method of treatment can be gathered to some extent from the headings to the six chapters: surface phenomena in pure liquids; surface phenomena in solutions; adsorption of gases by solids; phenomena at the solid-liquid interface; colloidal solutions; phenomena of coagulation and gels. We cannot recollect seeing any corresponding English text-book of a similar handy size that attempts to cover so extensive a range of colloidal phenomena. Its value to the technical chemist is enhanced by brief accounts of practical applications: Chapter IV, for instance, discusses the significance of phenomena at the solid-liquid interface in analytical chemistry, dyeing, agricultural chemistry and chemical reactions in general. A subject index would add considerably to the usefulness of the work.

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PHYSICAL ASPECTS OF ORGANIC CHEMISTRY. By William A. Waters. With an Introduction by Professor T. Martin Lowry. Pp. 501. George Routledge and Son, Ltd. 25s. net.

One of the most conspicuous features of post-war chemistry has been the application to chemical problems of the new physical conceptions of atomic and molecular structure. On these lines a novel type of organic chemistry is being developed in which the course of a reaction is traced back to the electrical properties of the molecult and ultimately to the electronic structure of the component atom. This review of the present position is therefore a welcome addition to books on chemistry. Actually, it was originally planned about six years ago by Professor Lowry, who invited the present author to collaborate in the preparation of a book of this nature. The various chapters deal with chemical affinity, physical themes of molecular structure, valency, electrical dysoles, chemical reactivity, unsaturation, free radicles, ionisation and ionic reactions, acidity, the reactivty of helogen compounds, general polarity, hydrolysis and sterification, ionotropic change, molecular rearrangement, and conjugation.

ALKALI production in Italy showed an increase in 1935 over 1934, when caustic soda production was reported at 83,250 metric tons, solid, and 70,640 tons, liquid. Soda ash production in 1934, exclusive of quantities used for caustic soda production, was 122,000 tons; sodium bicarbonate, 3,120 tons; and caustic potash, basis 36-40° Be., 1,370 tons.

From Week to Week

A PARTY OF DANISH SCHOOL BOYS staying in Nottingham for a fortnight were shown over the works of Boots Pure Drug Co., Ltd., at Beeston, on August 6, and made a tour of the Stanton Ironworks on Tuesday.

A MODEL OF THE COMPLETE LAY-OUT for a 120-ton 10,000 horse-power Mond gas producer plant with ammonia recovery apparatus has been lent to the Science Museum, London, by the Power Gas Corporation, Ltd.

A FIRE which broke out at the works of the Tayside Floor-cloth Co., Ltd., Newburgh, due to the overflowing of boiling linseed oil, caused damage amounting to £400. Generating plant, oil tanks, and other equipment were totally destroyed.

THE D'ARCY EXPLORATION CO., a subsidiary of the Anglo-Iranian Oil Co., Ltd., which is boring for oil at Paulsgrove, near Portsmouth, has now sunk its bore-hole to a depth of 2,555 ft. All the chalk and clay have been penetrated and the drill is now cutting through shales and sandstone.

THE MERGER IS ANNOUNCED of the Unyte Corporation and the Plaskon Co. The new company will be known as the Plaskon Co., Inc., and will be the world's largest producer of urea and formaldehyde resins. This is the first consolidation in the plastics industry for many years, and the new company takes over all processes and patent rights formerly held by the Unyte Corporation.

TWO MEN HAD NARROW ESCAPES at Bowran and Co.'s paint works at Pelaw, Hebburn-on-Tyne, on Monday, when fire broke out and destroyed the pitch-boiling shop. The men, Claud Renton and James Seaton, were pouring pitch when the hot liquid overflowed on to a fire and set the whole building on fire. They had to rush for safety when the burning liquid threatened to envelop them.

IMPROVEMENT IN THE CHEMICAL ENGINEERING INDUSTRIES in Scotland is indicated by plans for works extensions which have been submitted to Glasgow dean of guild court. Blairs, Ltd., the manufacturers of sugar machinery and similar plant, have been forced by pressure of orders to extend their workshops; Colvilles, Ltd., the metallurgical firm, are going to extend their central offices, and an addition will also be made to the new oil factory of Pearson, Beckitt and Co.

AN OUTLINE OF THE THEORY of the comparatively new method of volumetric analysis involving the use of certain dyestuffs which function as adsorption indicators is given in a booklet just issued by The British Drug Houses, Ltd. The various indicators described in the booklet, and also a collection of fourteen of the most useful of them in a small box, can be obtained for the convenience of analytical chemists and those who are engaged at schools and colleges and desire to demonstrate the technique of precipitation methods in volumetric analysis.

A LANCASHIRE TEXTILE CHEMIST has discovered how to colour and finish asbestos in such a way that it looks like a textile. The dye is tolerably fast to washing. As the result of the discovery an exhibition of coloured asbestos fabrics was held in London last week by Bell's Asbestos and Engineering Supplies, Ltd., including motoring suits, housewives' aprons, rugs and blankets. Asbestos materials will not be on the market generally until the winter, though some of them are already in use. Presently, from utility fabrics, other fabrics may emerge as the skill of the dyer and the weaver increases. The primary difficulties of dampness, clamminess, and a tendency to fluff have been overcome.

THE WORLD'S MOST FAMOUS INVENTION in any one year is in future to win for its creator a new medal, the Yorkshire Medal, to be awarded by the Institute of Patentees. The one condition imposed—the invention must not in any way relate to an article of warfare, is an appropriate snub to Government Departments and honours lists which have so often encouraged the activities of war-mongering inventors in preference to those assisting industry. The medal is the gift of a Yorkshireman who died three years ago, Mr. Hoffman Wood, an architect, of Addingham, Yorkshire. In his will he directed that "a fund of £1,000 should be set aside, and that out of the income a gold medal was to be bought and presented to the person who produced in each year the most valuable invention not in any way connected with warfare."

SIX MEN WERE GASSED, one of them fatally, at the Normanby Park Steel Works of J. Lysaght, Ltd., Scunthorpe, on August 7. The dead man was Bernard Butterworth (28), married, of Sheffield Street, Scunthorpe, who came from South Wales. Four of the remaining five men, who had narrow escapes, are still in Scunthorpe Hospital. The accident occurred in one of the soaking pits where blast furnace gas is passed through to re-heat steel ingots before rolling. Owing to the holidays the pits were not working and three of the men are believed to have been cleaning the bottom of one of them when they were overcome by fumes. A crane driver saw the men reeling down the ladders and shouted for help. The first three volunteers to go into the pit and recover the men were also overcome by the blast furnace gas and carbon monoxide which is very difficult to detect.

THE COUNCIL of the Mining Institute of Scotland has decided that the general meeting usually held at the Royal Technical College, Glasgow, in August, shall be postponed until October.

THE ROYAL SCOTTISH AUTOMOBILE CLUB has reported on the recent trial run, from London to Glasgow, with a three-ton lorry using smokeless fuel as a source of producer gas. "Suncole," a porous coke produced in a special low temperature retort, and a coke prepared by carbonising Irish peat in a similar retort, were both tested and the peat fuel was definitely superior to the other.

THE HOME SECRETARY has made an order authorising the employment on two-day shifts of women and young persons over 16 years of age in examining, cutting and racking glass plates at the Doncaster Glass Works of Pilkington Brothers, Ltd., subject to conditions as to weekly alteration of shifts, accommodation for clothing and facilities for washing and for taking meals.

THE CONTINUED DEMAND for Lubrication Research Technical Paper No. 1 ("The Analysis of Commercial Lubricating Oils by Physical Methods") has necessitated a second edition. The opportunity has accordingly been taken for revising the subject matter without substantially altering it. The paper is obtainable from H.M. Stationery Office, price 9d.

TWO NEWCASTLE BOYS RECEIVED SERIOUS INJURY when a toy chemical set with which they were experimenting exploded in their garden. The boys were taken to Newcastle Infirmary with severe head injuries. The father of one of the boys said that his son was given a toy chemical set as a Christmas present, and it was thought to be harmless. He considered that shopkeepers should not be allowed to sell such sets as toys if there was any possibility of their proving dangerous.

FOR THE RECREATION OF EMPLOYEES of Stothert's, Ltd., manufacturing chemists, of Atherton, Lancashire, Mrs. H. Stothert, on August 1, opened a new bowling green in the grounds of Stothert's Welfare Society, at Atherton. The green has cost over £300. In the opening game between Mr. M. H. Stothert and Mr. A. J. Mercer, J.P., both directors of the firm, Mr. Stothert proved the winner. In a bowling handicap which followed, Mr. Stothert was beaten in the final by Mr. T. Bloy.

THE DIRECTORS OF TURNER AND NEWALL, LTD., have decided to offer to the stockholders the opportunity of subscribing a small proportion of additional capital on advantageous terms. Each ordinary stockholder on the register at July 25, 1936, is to be entitled to apply for one new ordinary share of £1 fully paid, in respect of each complete £10 of ordinary stock held at that date. The purchase price will be 70s. per share, payable as follows: 10s. per share on application and 60s. per share on October 1, 1936. Interest at the rate of 3 per cent. per annum will be paid on the amount of 10s. per share due on application for the period from August 22 to September 30, 1936.

ACCORDING TO THE QUARTERLY STATISTICS issued by the British Metal Corporation the consumption of lead, zinc and copper expanded in this country during the second quarter of the year. There was a small decline, however, in the consumption of tin. Consumption of lead rose from 83,000 tons—the figure for the first three months of the year—to 88,000 tons. The consumption of slab spelter improved from 48,000 to 52,000 tons, while the consumption of copper increased from 60,000 to 66,000 tons. The consumption of tin fell by 2,000 tons to 5,600 tons. Very appropriately THE CHEMICAL AGE, May 9, 1936, published a Special Lead Section giving a review of the application of lead and its alloys to chemical engineering practice, and predicting this growing importance of lead as an industrial metal.

THE WORLD'S LARGEST INGOT MOULD, weighing over 150 tons, was taken through the deserted streets of Attercliffe, Sheffield, from the works of the Brightside Foundry and Engineering Co., Ltd., to the Atlas Works of Thos. Firth and John Brown, Ltd., on July 31. The mould is 13½ ft. long and about 12 ft. wide. Seven furnaces were required to melt the 160 tons of molten iron needed to complete the casting, while another 70 tons were used to cast the bottom plate. This new mould will make it possible to cast steel ingots considerably in excess of 200 tons in weight, from which, in turn, huge steel forgings will be made for the manufacture of seamless hollow-forged drums for chemical and high-pressure plant.

BURGESS PRODUCTS CO., LTD., the British company which controls the European manufacture and distribution of Burgess zeolite, Burgess iron removal mineral ("Birm"), allied water treatment minerals and applications of the Burgess sound absorption system, recently held its annual sales conference under auspicious circumstances. The company has not only been compelled to take an overflow factory to handle extensions of business, but is commencing work on a third factory for the British manufacture of Burgess zeolite, Burgess iron removal mineral, etc. Five different factories have been required for the various stages of the company's expansion within six years of its foundation. At the close of the conference the directors entertained the departmental managers and sales engineers to dinner at the Grand Hotel, Leicester.

THE BRITISH STANDARDS INSTITUTION has just issued revised British Standard Specifications for Floating Dairy Thermometers (B.S.S. 695-1936), Clinical Maximum Thermometers (B.S.S. 691-1936), and Meteorological Thermometers (maximum, minimum and ordinary) Sheathed Type (B.S.S. 692-1936).

A CONTRACT FOR THE SUPPLY and erection of 25 steel oil storage tanks for Singapore has been placed by the Admiralty with the Tees-Side Bridge and Engineering Works, Ltd., of Middlesbrough. Over 8,000 tons of steel plates will be used in this contract, which will take two years to complete.

THE SENIOR BRITISH TRADE COMMISSIONER in Australia has advised the Department of Overseas Trade that the Australian Tariff Board will re-open its hearing in respect of Tariff Item 94 (B) on September 4 for the purpose of receiving evidence on sulphonated fatty alcohols. United Kingdom firms desiring to make representations should communicate at once with the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1, quoting reference 23533/1/171/32.

CYLINDERS OF HYDROCYANIDE GAS exploded when a collision occurred at Leeds on Wednesday between a van and a corporation tramway car. The van was taking several cylinders of gas from a chemical firm at Morley for use in the work of fumigation. The driver of the van, Walter Holroyd, of Morley, was killed, three people were gassed, and a boy cyclist was injured. John R. Jackson, conductor of the tramway car, realised that there was something unusual about the accident and he rushed to assist Holroyd. He opened the door of the van and was pulling Holroyd out when he was overcome by the gas and fell unconscious in the roadway. The tram driver and a pedestrian also went to the rescue, but were quickly gassed. Soon the gas became less effective, and helpers took Holroyd from the van, but two doctors were unable to revive him. A man who assisted in getting Holroyd out said he seemed to be dead within little more than a minute. He was obviously too weak to help himself. The tram conductor made a fine effort to release him, but when he had opened the door and tugged at the man's shoulder he was so badly overcome by the gas that he fell backwards.

Trade News

THE NAME OF Lorenco Products, Ltd., 22 Bloomsbury Street, W.C.1, has been changed to Middlesex Oil and Chemical Works, Ltd.

GLASGOW CORPORATION PUBLIC ASSISTANCE COMMITTEE has accepted the offers of the following Glasgow firms for laboratory equipment required at Lennox Castle Institution: Thomson Skinner and Hamilton, Ltd., Giffin and Tatlock, Ltd., and McCulloch Bros. and Wilson.

SHEARMAN BROTHERS, LTD., have issued a handy 4-page quarto general chemical price list, embracing over 300 products.

I. G. DYESTUFFS, LTD., of 278a St. Vincent Street, Glasgow, have removed to 119 Bothwell Street, Glasgow.

TRISODIUM PHOSPHATE is claimed to be the most reliable means for avoiding boiler incrustation when used according to the "Budenheim Process" (B.P. 361,810, 405,368 and 408,871). Particulars can be obtained from Phosphates, Ltd.

Inventions in the Chemical Industry

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

NUCLEUS-SUBSTITUTED ALIPHATIC-AROMATIC SULPHONIC ACIDS.—Chemische Fabrik R. Baumheier, A.-G. Jan. 23, 1935. 19620/35.

DESOXYMORPHINE C and dihydrodesoxymorphine D.—F. Hoffman-La Roche and Co., A.-G. Jan. 26, 1935. 655/36.

PRODUCING POROUS METAL BODIES.—Accumulatoren-Fabrik, A.-G. Jan. 22, 1935. 2095/36.

PURIFICATION OF VEGETABLE OILS in order to convert them into lubricating oils.—P. J. Beyer. Jan. 23, 1935. 2147/36.

REFINING ORGAN EXTRACTS.—Nyegaard and Co. Aktieselskap. Jan. 26, 1935. 2418/36.

STABLE SOLUTIONS OF LAEVO-ASCORBIC ACID or other 1-carbonyl 2:3-dienol compound.—I. G. Farbenindustrie. Jan. 26, 1935. 2532/36.

Specifications Accepted with Date of Application

PRODUCING BUTYL ALCOHOL by fermentation.—Commercial Solvents Corporation. March 8, 1934. 450,530.

WETTING, dispersing, and emulsifying agents.—J. W. Orelup. Oct. 17, 1934. 450,672.

WATER-INSOLUBLE AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). Nov. 17, 1934. 450,752.

AMINO-CHRYSENE-SULPHONIC ACIDS.—I. G. Farbenindustrie. Dec. 15, 1933. 450,598.

BASE EXCHANGE MATERIALS.—Naamlooze Vennootschap Octrooien Maatschappij Activit, and P. Smit. Jan. 14, 1935. 450,540.

ORGANIC SULPHUR COMPOUNDS.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). Jan. 18, 1935. 450,760.

CONVERSION PRODUCTS OF ACETYLENE.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). Jan. 18, 1935. 450,761.

ACID-RESISTING COMPOSITIONS.—C. R. Barsby, H. R. L. Streight, and Imperial Chemical Industries, Ltd. Jan. 18, 1935. 450,683.

ETHYLIDENE DIACETATE and homologous esters.—H. Dreyfus. Jan. 19, 1935. 450,684.

2-METHYL-3-HYDROXY-QUINOLINE-4-CARBOXYLIC ACIDS.—I. G. Farbenindustrie. Jan. 19, 1934. 450,842.

ALKYL HALIDES.—E. I. du Pont de Nemours and Co., and H. W. Daudt. Jan. 21, 1935. 450,843.

VINYL RESIN COMPOSITIONS and processes employing the same.—Carbide and Carbon Chemicals Corporation. March 15, 1934. 450,856.

REMOVING TIN FROM NIOBIUM ALLOYS.—Electro Metallurgical Co. March 21, 1934. 450,857.

DYEING PROCESS.—Imperial Chemical Industries, Ltd., A. W. Baldwin, and C. S. Woolvin. Jan. 24, 1935. 450,868.

DEOXIDATION OF ZINC.—Metamine Ges. Feb. 1, 1934. 450,690.

HIGH-POLYMERIC NITROGEN-CONTAINING COMPOUNDS.—A. Carpmael (I. G. Farbenindustrie). Jan. 26, 1935. 450,692.

PRESERVATION OF GREEN FODDER.—A. Carpmael (I. G. Farbenindustrie). Jan. 26, 1935. 450,693.

SILICIC ACID ESTERS.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). Jan. 30, 1935. 450,875.

MANUFACTURE OF CARBON BLACK.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). Jan. 30, 1935. 450,876.

ORGANIC SULPHUR COMPOUNDS.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). Feb. 15, 1935. 450,559.

DYESTUFFS OF THE ANTHRAQUINONE SERIES.—Soc. of Chemical Industry in Basle. Feb. 27, 1934. 450,700.

MONOAZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). March 15, 1935. 450,564.

DESTRUCTIVE HYDROGENATION of carbonaceous materials.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). March 19, 1935. 450,705.

Applications for Patents

(July 16 to 22 inclusive.)

PRODUCTION OF OLEFINES.—F. W. Johnson (I. G. Farbenindustrie). 19,752.

PRODUCTION OF FAST DYEING.—F. W. Johnson (I. G. Farbenindustrie). 19,883.

PRODUCTION, ETC., OF VAT DYESTUFFS OF THE ANTHRAQUINONE SERIES.—F. W. Johnson (I. G. Farbenindustrie). 20,060.

SYNTHETIC TANNING AGENTS.—F. W. Johnson (I. G. Farbenindustrie). 20,062.

AGENTS FOR STRIPPING LACQUERS, ETC.—F. W. Johnson (I. G. Farbenindustrie). 20182.

REMOVAL OF ORGANICALLY COMBINED SULPHUR FROM GASES.—F. W. Johnson (I. G. Farbenindustrie). 20,183.

MANUFACTURE, ETC., OF DICARBOXYLIC ACIDS.—F. W. Johnson (I. G. Farbenindustrie). 20,184.

MANUFACTURE, ETC., OF HETEROCYCLIC DICARBOXYLIC ACIDS.—F. W. Johnson (I. G. Farbenindustrie). 20,185.

PRODUCTION OF ISOPROPYL ACETATE.—F. W. Johnson (I. G. Farbenindustrie). 20,315.

PRODUCTION OF ARTIFICIAL RESINS.—F. W. Johnson (I. G. Farbenindustrie). 20,316, 20,318.

COAL DISTILLATION APPARATUS.—T. Kretz. (Germany, July 17, 1935.) 19,816.

PRODUCTION OF MAGNESIUM.—Magnesium Metal and Alloys, Ltd. (Germany, July 20, 1935.) 19,931.

PRODUCTION OF COLOURED PIGMENTS FROM TITANIC ACID DERIVATIVES.—L. Passerini. (Italy, July 20, 1935.) 20,068.

PRODUCTION OF MONOMERIC METHACRYLIC ACID ESTERS.—Röhm and Haas. (Germany, July 20, 1935.) 20,101.

MANUFACTURE OF CHROMIUM HYDROXIDE GREEN.—G. Siegle and Co. Ges. (Germany, Aug. 2, 1935.) 19,869.

MANUFACTURE OF CHROMIUM HYDROXIDE GREEN.—G. Siegle and Co. Ges. (Germany, Feb. 7.) 19,903.

CARBONISATION OF COAL, ETC.—G. W. Wallace. 20,226.

(July 23 to 29 inclusive.)

TREATMENT OF BITUMENS, ETC.—L. d'Antal. (Germany, July 26, '35.) 20,812.

PROCESS FOR DECOMPOSITION OF CELLULOSIC MATERIALS.—H. Bohunek and G. Mayrhofer. (Austria, Aug. 13, '35.) 20,654.

PROCESS OF CATALYTIC OXIDATION OF NAPHTHALENE.—C. Pleydell-Bouverie, and O. D. Lucas. (July 25, '35.) 20,794.

PREPARATION OF CELLULOSE XANTHATE SOLUTIONS.—Brown Co. (United States, Aug. 20, '35.) 20,550.

PRODUCTION OF ALUMINIUM OXIDE.—A. S. Burman. (Sweden, July 29, '35.) 20,881.

MANUFACTURE OF WATER-INSOLUBLE AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). 20,675.

MANUFACTURE OF ALCOHOLS.—A. Carpmael (I. G. Farbenindustrie). 20,903.

MANUFACTURE OF ACETALS.—B. Coccia, and A. Contardi. (Italy, July 26, '35.) 20,762.

MANUFACTURE OF ACETALS.—B. Coccia, and A. Contardi. (Italy, Nov. 16, '35.) 20,763.

MANUFACTURE OF CARBON COMPOUNDS.—H. Dreyfus. 20,403.

MANUFACTURE OF ORGANIC SUBSTANCES.—H. Dreyfus. 20,404.

TREATMENT OF CARBONACEOUS MATERIALS.—H. Dreyfus. 20,405.

FORMATION OF ORGANIC PRODUCTS.—H. Dreyfus. 20,406.

TREATMENT OF NATURAL FUELS.—H. Dreyfus. 20,407.

PROCESSING OF FUELS.—H. Dreyfus. 20,408.

MANUFACTURE OF CARBONACEOUS MATERIALS.—H. Dreyfus. 20,409.

PRODUCTION OF ARTIFICIAL MATERIALS.—H. Dreyfus. (Jan. 24.) 20,519.

MANUFACTURE OF ARTIFICIAL MATERIALS.—H. Dreyfus. 20,520.

HEAT TREATMENT OF OILS.—H. Dreyfus. 20,651.

HEAT TREATMENT OF GASES, ETC.—H. Dreyfus. 20,652.

PHOSPHATE FERTILIZERS.—H. D. Elkington (Bayerische Stickstoffwerke, A.-G.). 20,805.

MANUFACTURE OF CELLULOSE.—L. S. E. Ellis (Koetschet). 20,451.

TREATMENT OF TARS.—W. W. Groves. (Germany, Dec. 21, '35.) 20,530.

MANUFACTURE OF CONDENSATION PRODUCTS.—W. W. Groves (I. G. Farbenindustrie). 20,422.

MANUFACTURE OF ESTERS.—Hercules Powder Co. (United States, Aug. 21, '35.) 20,426.

MANUFACTURE OF HYDROCARBONS.—R. Hill. 20,928.

PROCESS FOR DECOMPOSITION OF CELLULOSE MATERIALS.—H. Hoch. (Austria, Aug. 13, '35.) 20,654.

MANUFACTURE OF SUGAR DERIVATIVES of 1:2-diamino-4:5-dimethylbenzenes.—F. Hoffman-La Roche and Co., A.-G. (Germany, Aug. 23, '35.) 20,997.

WATER-SOFTENERS.—I. G. Farbenindustrie. (Germany, July 25, '35.) 20,545.

MANUFACTURE OF ARTIFICIAL MATERIALS.—I. G. Farbenindustrie. (Germany, July 26, '35.) 20,732.

MANUFACTURE OF AZO DYESTUFFS.—I. G. Farbenindustrie. (Germany, July 27, '35.) 20,733.

PRODUCTION OF FLUORINE.—I. G. Farbenindustrie. (Germany, July 27, '35.) 20,771.

MANUFACTURE OF VAT DYESTUFFS.—I. G. Farbenindustrie. (Germany, July 27, '35.) 20,772.

ANTHROQUINONE DYESTUFFS.—Imperial Chemical Industries, Ltd., and C. Shaw. 20,591.

MANUFACTURE OF LUBRICANTS.—Imperial Chemical Industries, Ltd., and D. W. F. Hardie. 20,806.

MANUFACTURE OF HYDROCARBONS.—Imperial Chemical Industries, Ltd., and E. Isaacs. 20,928.

MANUFACTURE OF ACETYLENE.—G. W. Johnson (I. G. Farbenindustrie). 20,541.

SOFTENING AGENTS.—G. W. Johnson (I. G. Farbenindustrie). 20,546.

SEPARATION OF TERTIARY OLEFINES from gas mixtures.—G. W. Johnson (I. G. Farbenindustrie). 20,754.

PRODUCTION OF SYNTHETIC RESINS.—Kodak, Ltd. (Eastman Kodak Co.). 20,470.

PRODUCTION OF CHEMICAL REACTIONS.—L. Löwenstein. (Germany, July 25, '35.) 20,798, 20,799.

PRODUCTION OF CHEMICAL REACTIONS.—L. Löwenstein. (Germany, Aug. 1, '35.) 20,800.

PRODUCTION OF CHEMICAL REACTIONS.—L. Löwenstein. (Germany, March 6.) 20,801.

MANUFACTURE OF ESTERS.—Soc. of Chemical Industry in Basle. (Switzerland, Aug. 2, '35.) 20,990.

MANUFACTURE OF ESTERS.—Soc. of Chemical Industry in Basle. (Switzerland, July 6.) 20,991.

Chemical and Allied Stocks and Shares

SENTIMENT in the stock and share markets has been influenced by the uncertainty attaching to the international situation and rather lower prices have ruled for industrial shares. Shares of chemical and associated companies were steady and show few movements against holders. Imperial Chemical were reported to be in larger demand. As compared with a week ago the ordinary shares have moved up from 39s. 6d. to 40s. and the deferred from 9s. 7½d. to 9s. 9d. B. Laporte have remained firm at the higher price of 128s. 9d. made in the previous week. Fison, Packard and Prentice went back moderately to around 44s., but Cooper, McDougall and Robertson continued to show more activity and are higher at 38s. 9d. at the time of writing. United Molasses at 23s. 10½d. have held nearly all their rise of the previous week, but the decline in tanker freight rates has led to the view that the directors will probably follow a conservative dividend policy.

Distillers were again good and have retained their rise to around 105s. It may be recalled that at the annual meeting last month the chairman mentioned, in explanation of the conservative dividend policy followed, that there is always the possibility that the company might have to undertake large-scale developments of a new character. Since then the market has been talking of important developments impending in connection with industrial alcohol, but there appears to be no basis for the rumours which are current. Last year fully 27 per cent. was earned on the ordinary shares and the dividend was again limited to 20 per cent. Greeff Chemical Holdings 5s. ordinary shares were virtually unchanged at 9s. 1½d. and the 10s. preference shares have kept their rise to 11s. 7½d. The assumption in the market is that the company will probably decide to pay an interim dividend on its ordinary shares. British Oil and Cake Mills have kept around 49s. 4½d. while United Premier Oil and Cake have moved up 3d. to 12s. 1½d. The market is continuing to take the view that a favourable increase in the dividend is in prospect, although it is possible that rather than make a large increase in the dividend it might again be decided to distribute a share bonus. Last year the dividend was 10 per cent. and, in addition, there was a 5 per cent. share bonus.

British Drug Houses remained at 20s. at which an apparently attractive yield is offered on the basis of last year's conservative dividend of 5 per cent. Unilever have moved up 6d. to 35s. 9d. International Nickel were active, having remained under the influence of the larger quarterly dividend and the belief that the forthcoming quarterly statement will show an excellent further increase in the company's earnings. Imperial Smelting Corporation ordinary shares have remained at 17s. Despite the lower price for zinc which now rules, the market is continuing to anticipate that the resumption of dividends can be expected for the past financial year which ended on June 30. Lawes Chemical have changed hands around the better price of 8s. 9d. and have continued to be held steadily in advance of publication of the results. British Industrial Plastics 2s. shares remained around 4s. Erinoid 5s. shares made the lower price of 8s. 9d., but the general belief in the market is that the dividend will probably be kept at 10 per cent. The 3s. shares of William Blythe changed hands at the higher price of 7s. 3d. International Paint and Pinchin Johnson were inclined to make higher prices on the possibility of larger interim dividends being announced shortly. Blythe Colour Works have reacted to 13s., but this reflects the deduction of the recently declared interim dividend.

Consett Iron and the majority of other leading iron and steel shares have been well maintained. Staveley were bought on hopes that market estimates of a 10 per cent. dividend for the year will be realised. Triplex Safety Glass were again a strong and active feature on market hopes of a bonus. Associated Portland Cement and other cement shares received a good deal of attention at higher prices. British Celanese issues were dull in common with the shares of other rayon companies. The market is still hopeful that later in the year there may be a scheme to deal with the arrears of dividend on British Celanese second preference shares. Herbert Green shares remained out of favour, the disposition being to await publication of the results for news as to the company's progress. Leading oil shares were active at higher prices. Trinidad Leaseholds benefited from hopes that the dividend may be brought up to 25 per cent. Anglo-Iranian moved up in response to the view that by reason of recent developments the company has probably obtained control of Mosul Oilfields, Ltd.

Weekly Prices of British Chemical Products

THERE are no price changes to report in the general markets for heavy chemicals, rubber chemicals, wood distillation products, perfumery chemicals, essential oils and intermediates. In the coal tar products section there has been yet another general advance of from a penny to twopence per gallon in the price of cresylic acid. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

MANCHESTER.—This has been another relatively dull week on the Manchester chemical market. With the industrial holiday season in Lancashire and the near Yorkshire towns at its height sellers of chemicals have reported very little fresh buying during the past week and deliveries of pretty well all descriptions of materials into consumption against contract commitments have been interfered with. From now on, however, this seasonal restrictive influence will be on a gradually diminishing scale. Specifications are expected to improve in respect both of number and the quantities involved, and new business should also show a noticeable improvement compared with recent standards. In the by-products section prices are mostly steady and here and there a slight expansion of trading has been experienced.

GLASGOW.—Business in chemicals during the week has been of a restricted character, with prices continuing practically unchanged. The tar products market has been rather quiet during the week judging by the actual volume of new business arranged. There has been a definite lull in the execution of deliveries for consumers in the south. Some minor contracts in cresylic acids have been fixed for forward delivery, but on the whole manufacturers appear less concerned at the moment with new commitments in these products, than with the fulfilment of existing obligations. Prices of refined products are steady at current levels, and consignments for export under existing contracts are moving well. Heavy naphtha, naphthalene and pyridine 90%/160 are well looked after, while pitch and creosote remain comparatively quiet.

General Chemicals

ACETONE.—LONDON: £62 to £65 per ton; SCOTLAND: £64 to £65 ex wharf, according to quantity.

ACID, ACETIC.—40% technical, £16 12s. 6d. per ton. LONDON: Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £32 5s. to £34 5s.; tech., 40%, £16 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £32 5s.; tech., 80%, £30 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £48 to £50.

ACID, BORIC.—Commercial granulated, £27 per ton; crystal, £28; powdered, £29; extra finely powdered, £31; packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. B.P. cryst., £36; B.P. powder, £37. SCOTLAND: Crystals, in 1 cwt. bags, £28; powdered, in 1 cwt. bags, £29.

ACID, CHROMIC.—Flaked, 10d. per lb., less 2½%; ground, 10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 11¾d. to 1s. SCOTLAND: B.P. crystals, 1s. per lb., less 5%.

ACID, CRESYLIC.—97/99%, 2s. 11d. to 3s. per gal.; pale, 98%, 3s. 1d. to 3s. 2d.; dark, 2s. 6d. to 2s. 7d.; 99/100%, refined, 3s. 4d. to 3s. 6d. per gal.

ACID, FORMIC.—LONDON: £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: £2 10s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. LONDON: 11½d., less 5%. SCOTLAND: 11¾d. less 5%. MANCHESTER: 1s. per lb.

ALUM.—SCOTLAND: Ground, £10 2s. 6d. per ton; lump, £9 12s. 6d.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM SULPHATE.—Neutral quality, 20.6% nitrogen, £7 per ton.

ANTIMONY OXIDE.—SCOTLAND: £61 to £65 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines SCOTLAND: White powdered, £17 10s. ex store. MANCHESTER: White powdered Cornish £20 ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—LONDON: £10 10s. per ton. SCOTLAND: £11.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton in casks, special terms for contracts. SCOTLAND: £9.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots. SCOTLAND: Granulated, £14 10s. per ton in 1 cwt. bags, carriage paid.

CADMIUM SULPHIDE.—3s. 9d. to 4s. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. SCOTLAND: £5 10s. per ton net ex store.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¾d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 2⅝d. per lb.; liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s per cwt. SCOTLAND: £3 18s. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £24 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£25 to £27 per ton.

LEAD ACETATE.—LONDON: White, £33 15s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £34, brown £33.

LEAD NITRATE.—£32 10s. to £34 10s. per ton.

LEAD, RED.—SCOTLAND: £31 per ton less 2½%, carriage paid.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £41.

LITHOPONE.—30%, £16 to £16 5s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store

MAGNESIUM CHLORIDE.—SCOTLAND: £6 17s. 6d. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3⅝d. per lb.

PHENOL.—6¾d. to 7½d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5%, d/d U.K. Ground, 5½d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. per lb. less 5% carriage paid. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 4½d. per lb. MANCHESTER: £38 10s. per ton.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. Crystals, 8¾d. MANCHESTER: B.P. 11d.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 7½d. to 8d. per lb. SCOTLAND: 7½d. net, ex store. MANCHESTER: Yellow, 8¼d. to 8½d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks. Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—LONDON: £21 per ton. SCOTLAND: £17 15s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: £12 10s. per ton in 1 cwt. kegs, £10 15s. per ton in 2 cwt. bags. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. SCOTLAND: 4d., less 5% carriage paid.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£29 per ton. SCOTLAND: £1 10s. per cwt.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5¼d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 5½d.

SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d. to £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals, spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £15 per ton f.o.b. SCOTLAND: £16 10s. per ton less 5%.

SULPHUR.—£9 to £9 5s. per ton. SCOTLAND: £8 to £9.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 4s. 6d. per lb. in 1-cwt. lots.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—10d. to 11d. per lb.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 2s. 10d. to 2s. 11d. per gal.; 99/100%, 3s. 3d. to 3s. 9d. per gal., according to specification; pale 98%, 3s. to 3s. 1d.; dark, 2s. 4d. to 2s. 5d. GLASGOW: Pale, 99/100%, 2s. 9d. to 3s. 3d. per gal.; pale, 97/99%, 2s. 6d. to 2s. 9d.; dark, 97/99%, 2s. 3d. to 2s. 4d.; high boiling acids, 1s. 8d. to 2s.; American specification, 2s. 9d. to 3s.

ACID, CARBOLIC.—Crystals, 6¾d. to 7¼d. per lb.; crude, 60's, 2s. 3d. to 2s. 6d. per gal. MANCHESTER: Crystals, 6¾d. per lb.; crude, 2s. 7d. per gal. GLASGOW: Crude, 60's, 2s. 4d. to 2s. 6d. per gal.; distilled, 60's, 2s. 8d. to 3s.

BENZOL.—At works, crude, 8¼d. to 9d. per gal.; standard motor 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 7d. to 1s. 7½d. LONDON: Motor, 1s. 3½d. GLASGOW: Crude, 8½d. to 9d. per gal.; motor, 1s. 3d. to 1s. 4d.

CREOSOTE.—B.S.I. Specification standard, 5½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 4¾d. to 5½d. GLASGOW: B.S.I. Specification, 5½d. to 5¾d. per gal.; washed oil, 4½d. to 4¾d.; lower sp. gr. oils, 4¾d. to 5d.

NAPHTHA.—Solvent, 90/100%, 1s. 5½d. to 1s. 6½d. per gal.; 95/160%, 1s. 7d.; 90%, 1s. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. GLASGOW: Crude, 5½d. to 6d. per gal.; 90% 160, 1s. 4d. to 1s. 5d.; 90% 190, 1s. to 1s. 1d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £16 10s. per ton; purified crystals, £25 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. GLASGOW: Fire lighter, crude, £7 to £8 per ton (bags free).

PYRIDINE.—90/140%, 5s. to 7s. per gal.; 90/180, 2s. 3d. GLASGOW: 90% 140, 6s. to 6s. 6d. per gal.; 90% 160, 5s. to 5s. 6d.; 90% 180, 2s. 6d.

TOLUOL.—90%, 1s. 11d. per gal.; pure, 2s. 3d. GLASGOW: 90% 120, 1s. 11d. to 2s. per gal.

XYLOL.—Commercial, 2s. per gal.; pure, 2s. 2d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

PITCH.—Medium, soft, 35s. to 36s. per ton, in bulk at makers works. MANCHESTER: 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 32s. 6d. to 35s. per ton; in bulk for home trade, 32s. 6d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—August, £6 14s. 6d. per ton; September, £6 16s.; October, £6 17s. 6d.; November, £6 19s.; December, £7 0s. 6d. for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station. MANCHESTER: Brown, £9; grey, £10 10s.

CALCIUM CYANAMIDE.—August, £6 15s. per ton; September, £6 16s. 3d.; October, £6 17s. 6d.; November, £6 18s. 9d.; December, £7: carriage paid to any railway station in Great Britain in lots of 4 tons and over.

NITRO-CHALK.—£7 5s. per ton to end of September.

NITRATE OF SODA.—£7 12s. 6d. per ton to end of September.

CONCENTRATED COMPLETE AND AMMONIUM PHOSPHATE FERTILISERS.—Prices have not yet been fixed and at present it is impossible to give any indication as to the date of any announcement or of the trend of prices.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 to £8 10s. per ton; grey, £10 5s. to £10 15s. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £9; grey, £10.

CHARCOAL.—£5 to £10 per ton, according to grade and locality.

METHYL ACETONE.—40-50%, £45 to £48 per ton.

WOOD CREOSOTE.—Unrefined 6d. to 1s. 6d. per gal., according to boiling range.

WOOD, NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 9d. per gal.

WOOD TAR.—£2 to £2 10s. per ton.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100%, d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

o-CRESOL 30/31° C.—6d. per lb. in 1-ton lots.

p-CRESOL 34-5° C.—1s. 6d. per lb. in ton lots.

m-CRESOL 98/100%.—1s. 7d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 10½d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—In bags, £88 15s. per ton; in casks, £89 15s.

α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.

o-NITRANILINE.—3s. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—9½d. to 11d. per lb.

p-TOLUIDINE.—1s. 11d. per lb.

Latest Oil Prices

LONDON, Aug. 12.—LINSEED OIL was steady. Spot, £29 per ton (small quantities); Aug., £26 10s.; Sept.-Dec., £26 12s. 6d.; Jan.-April, £26 12s. 6d., naked. SOYA BEAN OIL was firm. Oriental (bulk), spot, Rotterdam, £24 10s. per ton. RAPE OIL was steady. Crude extracted, £34 10s.; technical refined, £35 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £29 per ton; refined common edible, £33 and deodorised, £35, naked, ex mill (small lots £1 10s. extra). TURPENTINE was unchanged. American, spot, 40s. 6d. per cwt.

HULL.—LINSEED OIL.—Spot quoted £27 10s. per ton; Aug. and Sept.-Dec., £27 2s. 6d.; Jan.-April, £26 17s. 6d. COTTON OIL. Egyptian, crude, spot, £30 per ton; edible, refined, spot, £32; technical, spot, £32; deodorised, £34, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £23 per ton, naked. GROUNDNUT OIL.—Extracted, spot, £34 per ton; deodorised, £37. RAPE OIL.—Extracted, spot, £33 10s. per ton; refined, £34 10s. SOYA OIL.—Extracted, spot, £29 10s. per ton; deodorised, £32 10s. COD OIL.—F.o.r. or f.a.s., 25s. per cwt., in barrels. CASTOR OIL.—Pharmaceutical 43s. per cwt.; first, 38s.; second, 36s. TURPENTINE.—American, spot, 43s. 3d. per cwt.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

THORNFIELD, GODFREY (trading as Beaucaire Laboratories), 36 Rossmore Court, Park Road, N.W., chemist. (C.C., 15/8/36.) £22 3s. 10d. June 18.

Companies Winding-up Voluntarily

THE YORKSHIRE SUGAR CO., LTD. (C.W.U.V., 15/8/36.) By special resolution. July 30. William A. Ferrier, engineer, of 14 The Park, Newark-on-Trent, and George N. Wardle, of "Elmhurst," Palmerston Road, Peterborough, secretary of the company, appointed as liquidators.

THE CENTRAL SUGAR CO., LTD. (C.W.U.V., 15/8/36.) By special resolution. July 30. William A. Ferrier, engineer, of 14 The Park, Newark-on-Trent, and George N. Wardle, of "Elmhurst," Palmerston Road, Peterborough, secretary of the company, appointed as liquidators.

SHROPSHIRE BEET SUGAR CO., LTD. (C.W.U.V., 15/8/36.) By special resolution. August 5. C. W. Newstead, of 81 Great Tower Street, London, E.C.3, appointed as liquidator.

M. E. OIL SYNDICATE, LTD. (C.W.U.V., 15/8/36.) By reason of its liabilities. July 29. Frederick J. Duck, of 66 Broad Street Avenue, London, incorporated accountant, appointed as liquidator.

Voluntary Liquidation

MAJOR BRADLEY (PRODUCTS), LTD., chemical manufacturers, Oxley Works, Queen Street, Manchester.—Pursuant to Section 238 of the Companies Act, 1929, a meeting of creditors was held on July 31 at Manchester. According to a statement of affairs which was submitted the assets totalled £55 7s. 6d., but they were subject to preferential claims of £69. There was, therefore, a deficiency as regarded the preferential claims, of £13 12s. 6d., and there were no assets available to meet the claims of the unsecured creditors totalling £187 10s. 1d. The issued capital of the company was £1,020, and so far as the shareholders were concerned there was a deficiency of £1,221 2s. 7d. It was reported that the company was incorporated on August 26, 1935, with a nominal capital of £100, which was increased to £1,500, on April 16, 1936. The activities of the company had never really passed the experimental stage and very little business appeared to have been done. Since the inception of the company the purchases had been £290, and the sales approximately £100. Prior to the creditors' meeting the shareholders had met and passed the usual resolution putting the company into voluntary liquidation, and had nominated Mr. A. Yearsley, Manchester, as liquidator. After a lengthy discussion it was decided to confirm the voluntary liquidation of the company with Mr. Yearsley as liquidator.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Cosco. 561,622. Alcohol (other than ordinary or ethyl) for use in manufactures and alcohol for use in scientific research and chemical substances for use as solvents in the course of manufacture of textile fabrics. Commercial Solvents (Great Britain), Ltd., Aldwych House, Aldwych, London, W.C.2. July 18, 1935.

Recoldor. 562,090. Chemical substances used for agricultural and horticultural purposes. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. August 8, 1935.

Belsol. 560,516. Solvents, softeners and plasticisers, being chemical substances for use in manufacturers. The Geigy Colour Co., Ltd., National Buildings, Parsonage, Manchester, 3. May 29, 1935.

Beckolbase. 561,418. All goods included in Class 1. Beck, Koller and Co. (England), Ltd., 479 Edge Lane, Liverpool. July 9, 1935.

Aquador. 561,376. Water softening preparations. Drake and Gorham, Ltd., 36 Grosvenor Gardens, London, S.W.1. July 8, 1935.

Company News

Paterson Engineering Co.—A final dividend of 10 per cent., less tax (same), has been declared on ordinary shares for year ended April 30, 1936. Warrants will be posted August 25.

William Fulton and Sons.—Profit for year to June 30 last, after providing for maintenance and repairs, amounts to £4,503 (£2,487) to which is added £2,166 brought in, making £6,669. To reserve is placed £8,000 (against transfer of £10,000 from reserve), year's preference dividend absorbs £3,279, depreciation £8,500, and directors' fees £650, leaving £2,240 to go forward.

South African Druggists, Ltd.—The directors have declared a maiden interim of 6 per cent., less tax, on the ordinary shares, payable August 23. The company, which is a holding concern, was registered in South Africa last December. Authorised and issued capital is £800,000 divided into £400,000 in 5½ per cent. £1 preference shares and £400,000 in 5s. ordinary shares.

Roan Antelope Copper Mines.—A net profit of £142,500 is revealed in the report for the quarter ended June 30 last. This is the fourth quarter of the company's year, and an addition of the four quarters' net profits gives a figure of £514,500, compared with £330,647 for the previous year, an increase of £183,853. Gross revenue for the June quarter was £462,500, against £449,500 the previous quarter.

Limmer and Trinidad Lake Asphalt Co.—The directors have declared interim dividends of 6 per cent., tax free, for the half-year to June 30 last, on both the participating preference and the ordinary shares. Both distributions are payable on September 7. The holders of the £325,000 ordinary capital have received similar dividends for many years past, and since 1931 finals of 8 per cent. have been paid, making the total dividend each year 14 per cent.

New Companies Registered

Arnold Products (London), Ltd.—Registered August 10. Nominal capital £1,000. To acquire the sole and exclusive concession for the contracting and sales rights in the City of London and its environs and/or other agreed localities of the products manufactured by A. L. Arnold and Co., Ltd., for (inter alia) the extermination of rats, mice, cockroaches, beetles and ants, etc. Chairman: Stephen A. Brice, 61 Queens Road, Richmond, Surrey.

Delroy Perfumery Co., Ltd., Rooms 39/41 Swan House, 133 Oxford Street, W.1.—Registered August 6. Nominal capital £100 in 1s. shares. Manufacturing and wholesale chemists, manufacturers, importers and exporters of, agents for and wholesalers and retailers of all kinds of essential oils, isolates, perfumery, etc. Directors: Alexander G. A. Chalmers, John W. West and Wm. S. Howell.

English Metal Oxide, Ltd.—Registered August 11. Nominal Capital £5,000 in £1 shares. Refiners, smelters, founders, recoverers and workers of metals, metallic ores, residues and scrap, minerals, chemicals and by-products thereof, etc. Subscribers: Florence Oliver, 73 Basinghall Street, E.C.2, clerk; and Frederick A. Smith.

W. H. Holland and Co., Ltd.—Registered August 1. Nominal capital £8,000 in 1,000 6 per cent. cumulative preference shares of £1 and 4,000 ordinary shares of £1. To acquire the business of dry soap, furniture cream and polish manufacturers now carried on by W. H. Holland and Co., Ltd. (incorporated on November 23, 1894), at Tostock, near Bolton. Directors:—Ernest Mills, 19 Melling Road, Southport; Wm. J. Holland, Mrs. Elizabeth Gresswell, and Herbert B. Dawson.

Ernest Hyatt, Ltd.—Registered August 6. Nominal capital £5,000 in £1 shares. Chemists, clinical analysts, cosmeticians, dealers in photographic apparatus and materials, etc. Subscribers: Eric Phillips, 16 Morella Road, Wandsworth Common, S.W.12, accountant; and Leonard W. Wood.

A. T. Strong, Ltd.—Registered August 8. Nominal capital £5,000 in £1 shares. Consulting, analytical and manufacturing chemists, etc. Directors: Arnold T. Strong, The Square, Wold, Glos.; Mrs. Doris G. Strong; Edgar V. Strong; and Otto J. Strong.

Unaphalt Roads (1936), Ltd.—Registered August 1. Nominal capital £1,000 in £1 shares. To acquire the business carried on by Unaphalt (Roads), Ltd., and to carry on the business of manufacturing chemists, manufacturers, exporters and importers of and dealers in bitumen, asphaltums, waxes, resins, pitches, etc. Subscribers:—Stanley R. Vincent, 141 Fenchurch Street, E.C.3; and Herbert F. Gough.

Virginia's Hollywood Preparations (1936), Ltd.—Registered August 10. Nominal capital £3,000 in £1 shares. To acquire the business of manufacturers of and dealers in face powders and toilet preparations carried on by a company of similar name incorporated in 1934 at 181 Gresham Road, Slough. Subscribers: E. J. Lowman, Amberley House, Norfolk Street, W.C.2; and A. J. Wheatland.